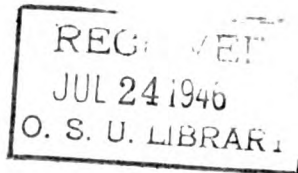


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JUNE 1946

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DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY**

**BUREAU OF MINES
R. R. SAYERS, DIRECTOR**

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GEOPHYSICAL ABSTRACTS 123

OCTOBER-DECEMBER 1945

WITH AN INDEX TO ABSTRACTS 120-123



COMPILED BY

V. SKITSKY

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 123

October - December 1945^{1/}

Compiled by V. Skitsky^{2/}

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1. GRAVITATIONAL METHODS

8186. Aquilina, C. Determinazioni relative di gravita eseguite nel 1939
(Relative Determinations of Gravity Made in 1939). Ric. Ingegn., Rome,
vol. 10, 1942, pp. 63-76.

In 1939, the author made a survey of relative gravity in the Mediterranean basin, $41^{\circ} 35.5'$ to $41^{\circ} 56.3'$ northern latitude and $0^{\circ} 10.3'$ to $0^{\circ} 28'$ longitude, referred to Mt. Mario. Ten stations were covered; 25 other stations had been occupied in the vicinity of Rome and in Albanian mountains during previous years. The new measurements revealed gravity anomalies ranging within the following limits: (1) With a free-air reduction, between + 29 and + 120 mgl., average + 60 mgl.; and (2) with a Bouguer reduction, between + 22 and + 87 mgl.; average + 41.5 mgl. - V. S.

8187. Baranov, V. Mesure indirecte de la densité des roches à l'aide du gravimètre (Indirect Measurement of the Density of Rocks by Means of a Gravimeter). Annales de Géophysique, Paris, vol. 1, No. 1, 1944, pp. 18-24,

The average density of superficial rocks enters as a parameter into the reductions of gravimetric measurements. It can be determined from a sample of measures of "g" made with a gravimeter. A method of calculation is offered for this purpose. It takes into consideration topographic corrections and permits an easy appraisal of the errors committed when these do not exceed a few centimeters in absolute value. - Author's abs., translated by V. S.

8188. Bulanzhe, Iu. D. On the Accuracy of Variometer Surveys of Gravity Anomalies (in Russian). Bull. Acad. Sci. U. R. S. S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 5, 1944, pp. 285-291.

In interpreting the gravity data of variometer surveys it is essential to take into account the possibility of accumulated errors of measurement. The problem of determining such errors is examined mathematically. Two formulas are derived for the calculation of the maximal average and relative errors, on the assumptions of a uniform distribution of variometer stations and an equal accuracy of observations. These formulas have been used for the calculation of errors made in surveying the anomaly at Ishimbaevo, Ural forelands. Computations showed that the measurements of anomalies of 1 to 2 mgl. were unsatisfactory. It is concluded that variometer surveys possess questionable accuracy and require for interpretation a detailed analysis of errors. - V. S.

- Gutenberg, B., and Richter, C. F. Seismicity of the Earth (Supplementary Paper). Bull. Geol. Soc. America, Baltimore, Md., vol. 56, No. 6, 1945, pp. 603-668 (see abs. 8229 in this issue).

8189. Hastings, W. K. Gravimeter Operations in the Foothills Belt of Alberta, Canada. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 526-534.

As part of a gravimeter survey in western Alberta, Canada, the work was extended into quite rugged areas of the Rocky Mountain foothills belt. This paper outlines the general methods of operation, carried out on horseback from a movable camp, which were employed where conventional methods of using trucks were impossible. Gravity observations were made with a new small-type Gulf gravimeter, which, complete with batteries and other accessories, weighs about 48 pounds. The reduced gravity results were quite smooth and regular in spite of rugged topography and terrain corrections running up to 7 milligals. - Author's abs.

8190. Kazinskii, V. A. Summation of the Oscillations of Two Gravimetric Pendulums on a Ship (in Russian). Bull. Acad. Sci. U. R. S. S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 6, 1944, pp. 381-384.

An equation is deduced for the oscillations of two gravity pendulums set in motion on a ship at sea. It is assumed that the ship undergoes only vertical and horizontal displacements in the plane of oscillation of the pendulums. The mathematical derivation is presented. The equation has the form:

$$\ddot{\theta} + \sqrt{(g - \ddot{z})^2 + \dot{y}^2} \cos \varphi_0 \sin \theta = 0.$$

Essential therein is the member $\cos \varphi_0$, accounting for the difference in amplitudes of oscillation. A comparison is made with the equation of B. C. Browne for the same phenomenon. - V. S.

8191. Khramov, D. N. An Experimental Test of the Hypothesis of Partial Isostatic Compensation (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 5, 1944, pp. 281-284.

The author introduces into isostatic calculation a new parameter, ϵ , the degree of compensation, in accordance with Malkin's theorem. The criterion for a valid choice of ϵ is the condition of a minimum sum of squares in the declination of the isostatic anomaly for average values. To test this parameter, the gravimetric data of the Caucasus were subjected to recalculation in the light of Heiskanen's work. It was found that the results based upon the hypothesis of partial isostatic compensation are not any less accurate than the results based upon the hypothesis of absolute compensation, and that the Caucasus is about one-half compensated. - Author's abs.

8192. Kilchling, Karl. Ein dynamisch-elastischer Schweremesser (A Dynamical Elastic Gravimeter). Ztschr. Geophys., Braunschweig, vol. 18, 1943, pp. 51-52.

A dynamical gravimeter is described. It consists of a weight supported in part by spiral springs and in part by a cord. The cord is tightly stretched and swings transversely. The distribution of the load over the springs and the cord can be so adjusted that changes in gravity will affect only the tension of the cord. Measurements of gravity are made by determining the duration of vibrations in the system. - V.S.

8193. Klaus, H. Torsion Balance Step Anomalies in Northern Tillman County, Oklahoma. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 507-525.

The results of a semi-detailed areal torsion-balance survey in Southwestern Oklahoma are shown by means of a gradient-curvature map, a gravity map, two second derivative contour maps, and gravity and second derivative profiles. Detailed quantitative calculations were made of a number of geological cross sections, two of which are shown on drawings. One of the drawings represents the surface situation with the highest probability rating, since it combines a high degree of geological probability with the fact that it will reproduce the plotted gravity and second derivative curves very closely. This interpretation embodies a fault with a throw of the order of magnitude of 10,000 feet.

If such interpretation is substantially correct, it implies a thick sedimentary section in the down-thrown block, which might be of great economic interest in prospecting for oil. A comparison of the gravity and second derivative data may be of interest to the geophysicist. The geologist may find the results of this survey interesting because of their possible bearing on the orogeny of the Wichita Mountains. - Author's abs.

8194. Lustikh, E. N. On the Use of Gravitational Data in Reconnoitering Natural Resources. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 43, No. 6, 1944, pp. 242-243.

The interpretation of gravimetric data is possible even when they are inaccurate and insufficiently dense. For illustration, the author discusses the calculation of the limiting depth of a layer causing an anomaly indicated only by such imperfect data. He offers a solution based upon the relationship between the first and second derivatives of the gravity potential and certain limiting assumptions. Mathematical derivation is presented. The formulas thus deduced have been applied to the data of gravity surveys made in several areas of the Ishimbaevo region. The findings obtained on the depth of the roof of Kungurian rocks were subsequently confirmed by seismic exploration. - V. S.

8195. Nettleton, L. L., and Elkins, T. A. Relation of Magnetic and Density Contrasts to Igneous-Rock Classifications. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 662-666.

Maps show that many large gravimetric and magnetic anomalies nearly coincide. The authors have investigated the possibility that such anomalies are caused by the same body of igneous rock in the basement. They determined the densities, magnetic susceptibilities, and intensities of magnetization of igneous rocks. The latter two determinations presented difficulties in the case of large bodies of rock, and they are discussed at length; an assumption was made that magnetic properties of igneous rocks are controlled largely by their magnetite content.

In the light of this work, data assembled from the writings of G. Grenet, L. Slichter, Kato, Nagata, etc., and from chemical analyses of igneous rocks were analysed statistically, and the rocks classified; the results are tabulated. The conclusions reached follow: "(1) A definite basis exists for the determination of susceptibility and intensity of magnetization of rocks from their magnetite content; (2) the possibility of determining magnetite content from chemical analysis opens access to a large volume of new data on magnetic susceptibilities and magnetization contrasts; (3) a reasonable range of probable magnetic and density contrasts within basement-rock has been established; and (4) a certain amount of association of magnetite content with density comes about through their mutual association with the chemistry of igneous rocks." It is believed that a better understanding of gravimetrically and magnetically surveyed areas should result from such investigations. (See also Geophys. Abs. 116, No. 7265.) - V. S.

8196. Oil Weekly. Geophysical Reconnaissance Work Under Way in Oklahoma. Houston, Tex., vol. 118, No. 8, 1945, p. 45.

An extensive geophysical reconnaissance campaign is under way in Oklahoma, with the greatest activity reported in the Anadarko Basin area in the western part of the State. Considerable work is also centering in the southern district, especially in Grady, Garvin, and McClain counties. 32 seismograph units and 6 gravimeter units are operating in Oklahoma, with Gulf Oil Corporation taking the lead and the Carter Oil Co. a close second. More units are headquartered at Chickasha than in any other town since the discovery of Magnolia Petroleum Co.'s deep distillate well east of the Chickasha gas area.

8197. Peters, J. W., and Dugan, A. F. Gravity and Magnetic Investigations at the Grand Saline Salt Dome, Van Zandt Co., Texas. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 376-393.

During May 1944, detailed gravity and magnetic surveys were made at the Grand Saline Salt Dome to secure additional information on the physical properties of this typical East Texas salt dome. The results of the surface gravity and magnetic surveys, and of the subsurface gravity survey in the Morton Salt Mine are illustrated and discussed. - Author's abs.

8198. Schleusener, A. Einige kritische Bemerkungen über die Bedeutung des vertikalen Gradienten für die Lagerstättegeophysic (A Few Critical Remarks on the Significance of the Vertical Gradient in the Geophysical Exploration of Deposits). Beitr. Angew. Geophys., Leipzig, vol. 9, 1942, pp. 303-319.

The author discusses the relative merits of vertical and horizontal gravity gradients. He finds that horizontal gradients, measured by torsion balance, are preferable for geophysical exploration. (1) With horizontal gradients, the anomaly gradient is almost as large as the normal gradient. On the other hand, with vertical gradients, the anomaly gradient constitutes only 1 percent of the normal gradient. Accordingly, it would be necessary to measure a normal vertical gradient of 3086 Eötvös with a precision of 1 percent in order to obtain its value within an error of ± 3 Eötvös. (2) In the case of an infinite subterranean band parallel to the surface, measurements of an anomaly made across the band by means of vertical gradients give an uncertain idea of the position of the band's edges; with horizontal gradients, however, the maxima and minima lie across the edges of the band. (3) Torsion-balance measurements are preferable for vertical gradients because they can be clarified by curvature values. - V. S.

8199. Sineriz, J. G. Estación gravimétrica observada en el Instituto Geológico y Minero de España con el gravímetro "Askania" (Gravimetric Station at the Geological and Mining Institute of Spain Uses Askania Gravimeter). Notas Comunic. Inst. Geol. Min. España, Madrid, No. 11, 1943, pp. 145-148.

An Askania electromechanical gravimeter has been acquired by the Geographical and Cadastral Institute, Spain. Among the purposes served was a linking of the gravity station at the Institute with the main gravity station of the Spanish net at the Astronomical Observatory. The Geological and Mining Institute quartered the intermediate station. Observations between stations were repeated back and forth. The results proved to be very satisfactory; the only variation in the measurements was 0.4 mgl. at the intermediate station. The gravimeter is described briefly; its precision and the quickness of the work are commended. - V. S.

8200. Skillings' Mining Review. Submarines Useful in Oil Exploration. Duluth, Minn., vol. 34, No. 26, 1945, p. 6. Also: Mining Record, Denver, Colo., vol. 56, No. 42, 1945, p. 3.

The President of the United States has recently issued a proclamation establishing federal jurisdiction over the natural resources of the country's continental shelf beyond the 3-mile limit. This action will permit the Federal Government to encourage the exploration of marine petroleum resources, believed to be very considerable. Submarines equipped with gravimetric surveying instruments may be called into use, because oil-bearing structures apparently extend all the way to the 600-ft. water depth marking the external limit of the continental shelf. - V. S.

2. MAGNETIC METHODS

8201. Bartels, J., and Burger, A. Potsdamer erdmagnetische Kennziffern (Potsdam Geomagnetic Index-Numbers). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 317-327.

Communication 12 presents Potsdam magnetic index-numbers for January - October 1942. The tables are organized in a new and more comprehensive form, including indices EK_1 , B, s, and $K_1(P)$. The nature and calculation of the latter indices is indicated. - V. S.

8202. Blum, V. J. The Magnetic Field Over Igneous Pipes. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 368-373.

In this paper, a brief summary of a magnetic survey of the Canon City, Colorado, area is presented. The primary object of the article is to give the results of magnetic traverses over exposed igneous pipes which contain an appreciable amount of magnetite. These traverses reveal a magnetic low near the geometric center of the tops of the pipes. Away from the center, the field increases in intensity and reaches its maximum strength along the southern edge of the intrusion. Small igneous pipes at or near the surface cause radical changes in the magnetic field within very short distances. - Author's abs.

8203. Bodle, R. R. Parícutin Magnetic Survey. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 628-630.

The U. S. Coast and Geodetic Survey made a magnetic survey in the region of Parícutin, Mexico. The investigation sought to determine whether any local changes had occurred in the earth's magnetic field as a result of this volcano's recent formation. The field party worked in the summer of 1943. Lines were run to form a grid in the immediate vicinity of the volcano; observations also covered the outer edges of a wider area of some 400 square miles. No outstanding anomalies were found. These results appear to indicate that not all volcanic formations produce large local magnetic anomalies. - V. S.

8204. Bozorth, R. M., and Williams, H. J. Effect of Small Stresses on Magnetic Properties. *Rev. Mod. Phys.*, Lancaster, Pa., vol. 17, No. 1, 1945, pp. 72-80.

A study was made of the changes of magnetization that occur when very small stresses are applied or removed. It aimed at clarifying the behavior of magnetic materials in the apparatus containing them. The measurements obtained are reported. - V. S.

8205. Brunner, W. Final Relative Sunspot-Numbers for 1944. *Ter. Magn. Atm. Electr.*, Baltimore, Md., vol. 50, No. 3, 1945, pp. 231-232.

Tables are presented giving the final relative sunspot-numbers for the whole disk of the sun for 1944, yearly means of relative numbers for 1933 to 1944, and the number of days without spots during the latter period. Graphs show the daily relative sunspot-numbers for 1944 and the previously obtained and smoothed monthly relative numbers for 1933 to 1944. - V. S.

8206. Haalck, H. *Der Gesteinsmagnetismus (Rock Magnetism)*. Leipzig, Akad. Verlagsges., Becker & Erler-Kom.-Ges., 1942, 90 pp. RM. 9.00.

This book deals with the physical properties and origins of rock magnetism, magnetism of rock samples, direction and magnitude of magnetization of considerable geological masses, and the relationship between rock magnetism and the magnetic field of the earth's crust. The view is advanced that the carrier of magnetism in rocks is principally magnetite; rock magnetism is generated by direct induction and depends upon the susceptibility of different rocks. The temperature also plays an important part; magnetization of rocks during their cooling through the Curie point brings about thermoremanent magnetism. The magnetizing force of the earth probably is supplemented by other, as yet unknown, local magnetizing forces. Total resulting rock magnetism in the earth constitutes at most 15 percent of the entire terrestrial magnetic field. Its direction generally corresponds to the direction of the terrestrial field. - V. S.

8207. Hoylman, H. W., and Durbin, H. A. A Study of the Susceptibility of Sediments. *Nat. Research Council, Am. Geophys. Union, Trans.* 1944, pt. IV, Washington, D. C., 1945, pp. 543-555.

There is discussed a portion of the experimental work undertaken in studying the susceptibility-behavior of sedimentary cuttings obtained from bore holes. A rather elaborate system of heat treatment (employing temperatures well above the Curie point) of the cuttings was developed, and their susceptibilities were determined at various stages during the treatment. In general, it was found that many original sediments - principally shales - with little or no susceptibility became strongly magnetic by a proper heat treatment. As a result of the work, it became apparent that it is possible to use the susceptibility values after heat treatment to make stratigraphic correlations within a geological province. - Author's abs.

8208. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Cheltenham, Maryland, for 1935-36. U. S. Coast and Geodetic Survey, Washington, D. C., MO-22, 1944, 113 pp.

This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of the D, H, and Z variometers with their abrupt changes, etc. The text includes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Authors' abs.

8209. Kolin, Alexander. Mercury Jet Magnetometer. Rev. Sci. Inst., Lancaster, Pa., vol. 16, No. 8, 1945, pp. 209-214.

Mercury is allowed to flow through a narrow nonconducting pipe provided with two pick-up electrodes at the ends of a diameter. In the presence of a magnetic field an e.m.f. is induced in the moving mercury. The potential difference detected between the electrodes is due to the component of the local magnetic field perpendicular to the pipe axis and to the diameter along which the electrodes are located. The device permits the establishment of the direction of the local field without introduction of a ferromagnetic body which might distort it. The magnetic field intensity in a sharply localized region can be determined. The instrument gives a direct reading proportional to the magnetic field intensity and lends itself to the study of rapidly varying transient fields as well as of constant ones. Fields of less than one oersted can still be easily detected. The magnetic field can be measured absolutely. Two ways of propelling the mercury are described. One of them utilizes gravity, and in the other method electromagnetic forces exerted upon a liquid conductor in a magnetic field are used. - Author's abs.

8210. Magnée, I. de, and Raynaud, J. Étude Magnétique de la Tectonique du Cambrien du Brabant à l'Est de Court-St. Etienne (Magnetic Study of Cambrian Tectonics in Brabant to the East of Court-St. Etienne). Ann. Soc. Geol. Belgique, Liege, vol. 67, No. 3, 1944, pp. M495-M549.

A very detailed magnetic survey has been made with a view to elucidating Brabant's Cambrian tectonics in the valley of the Orne between Court-St. Etienne and Mont-St. Guilbert. In this region scattered outcrops indicate the course of the contact between the black schists of Mousty and the green metamorphic rocks of Devillien (a Tubize stratum). The problem consisted in determining, in addition to Devillien's tectonics, whether their contact with the black rocks is normal or faulted. The magnetometer is well suited for solving this problem because of at least three horizons of clay slate containing magnetite near the summit of Devillien and manifested by strong anomalies of the vertical component of the geomagnetic field at the base of their outcrops. Isogam maps show these anomalies and permit the tracing of continuous interstratified magnetic horizons, even under a cover of Tertiary sands. The general character of Devillien is revealed as overthrust and faulted. On the contrary, the zone of outcrops of the black rocks of Mousty is distinguished by an absence of notable magnetic anomalies.

A mathematical interpretation of the magnetic "profiles" permitted determining, among other features, the approximate dip, depth, and thickness of the magnetite deposits. A theoretical chapter describes a method of interpretation suited for analysing the experimental curves obtained over thick layers possessing a magnetic susceptibility higher than that of the surrounding ground. Interpretation made it possible to conclude that the erect Devillien has generally a direction N. 50° E. in the southern part of the surveyed region, NS. in the central part, and N. 35° W. in the extreme north. Thus, the strata form an arc, with its concavity open westward. The continuity of the horizons containing magnetite is interrupted in the south by a fault disposed approximately in the NS. direction. To the west of this fault no anomalies are found and, probably, there are only black rocks of Mousty, as is also indicated by rare outcrops. The fault cannot be traced northward because it becomes parallel to the general direction of Devillien. Besides this fault there are other accessory overthrust faults. - Authors abs. translated by V. S.

8211. Maree, B. D. Notes on Some Magnetometric Surveys with Special Reference to Anomalies on Karroo Dolerites. Trans. Geol. Soc. South Africa, Johannesburg, vol. 46, 1943, pp. 107-118.

The magnetometric anomalies obtained on Karroo dolerites and the interpretation of these anomalies are described. The use of the magnetometer for the selection of sites for water boreholes on granites is discussed, with additional reference to the delineation of a Karroo basin underlain by Bushveld granite. - Author's abs.

8212. McCampbell, J. C. A Geomagnetic Survey of Some Bladen County, North Carolina, "Carolina Bays". Jour. Geol., Chicago, Ill., vol. 53, No. 1, 1945, p. 66.

F. Melton and W. Schriever have advanced the hypothesis that the oval depressions in Bladen County, N. C., termed "Carolina Bays", have been caused by the impact of meteorites. If this were so, appreciable amounts of magnetic material should be found buried immediately below or close to the bays. The author recently made a magnetic survey in the locality of the bays to test this hypothesis. The results showed pronounced magnetic highs close to the bays indicating the existence of magnetic rocks below. The highs are described and mapped on a geomagnetic map. - V. S.

8213. McNish, A. G. Changes in the Solar-Diurnal Variations in Vertical Magnetic Intensity at the Huancayo Magnetic Observatory, 1922-1943. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 560-563.

The configuration of the earth's general magnetic field is believed to be a determining factor in diurnal variations. A confirmation of this view was obtained at the Huancayo Magnetic Observatory situated at the equator. Here large secular changes in vertical intensity occurred between 1922 and

1943, and their effects on the diurnal variation were observed. Quiet days were selected for detailed examination, since they are most free from effects of magnetic activity. Even for these days a general shift in the phase of the variations was found as the sunspot-cycles progressed. The results of observations for two complete sunspot-cycles are presented. Findings bear out a previous prediction that Huancayo variations would assume more strongly the characteristics of the northern hemisphere. The relationship between secular changes in vertical intensity and differences in diurnal variations is explained in terms of the diurnal variation field of the western hemisphere. - V. S.

8214. Modriniak, N. A Preliminary Geophysical Survey of Part of the Whakatane District. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 327-331.

The intensity of magnetic force over a large part of the lowlands west and southwest of Whakatane is consistent with the geological interpretation that the hill country south of the flats continues northward under the deposits on the flats of pumice sand and silt of fluviatile and marine origin. Bores suggest that a strip of high magnetic values near the hot spring at Awakeri is due to a buried beach rich in iron sands. Seismic observations show that the loose deposits are at least 700 feet thick near Whakatane. - Author's abs.

8215. Ogg, A. The Comparison of Horizontal-Intensity Magnetometers. Ter. Mag. Atm. Elect., Baltimore, Md., vol. 50, No. 2, 1945, pp. 125-130.

The comparison of different types of horizontal-intensity magnetometers began in a previous paper (see Geophys. Abs. 122, No. 8079) is continued on the basis of further data. The instruments used are three La Cour horizontal-force magnetometers (QHM), a CIW magnetometer, an Adolf Schmidt standard magnetometer, and an F. E. Smith coil magnetometer; they are briefly discussed with regard to mathematical formulas, constants, and accuracy. The comparisons are made at first between the three QHMs. Then the coil magnetometer is compared with a QHM magnetometer, with the CIW magnetometer, and with the Schmidt magnetometer. The values observed and the findings of comparison are tabulated; findings are also plotted. The results show that the most consistent determinations are furnished by the La Cour magnetometers QHM. - V. S.

Peters, J. W., and Dugan, A. F. Gravity and Magnetic Investigations at the Grand Saline Salt Dome, Van Zandt Co., Texas. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 376-393 (see abs. 8197 in this issue).

8216. Rooney, W. J. Diurnal-Variation Anomalies at Tucson. Ter. Mag. Atm. Elect., Baltimore, Md., vol. 50, No. 3, 1945, pp. 175-184.

The seasonal changes in diurnal variation at Tucson, Ariz., possess an unusual interest because the observatory is in the transition belt where the type of variation changes markedly during the year. Generally, the Tucson monthly hodograms of diurnal variations in earth-current potential gradient show changes consistent with the recognized movement of the current systems in the ionosphere northward and southward with the sun. However, there exist, two definite anomalies less readily explained. These are discussed in detail, with illustrations of hodographs. - V. S.

8217. Rose, T. N. Secular Changes of the Earth's Residual Magnetic Field (in Russian). Inform. Sbornik Zemn. Magnet. Elektrich., Leningrad-Moscow, No. 5, pt. 2, 1940, pp. 6-10.

A comparison of the residual field obtained by the author for 1935.5 with Bauer's residual field of 1885.5 shows the general aspect of the field in northern Europe and Asia to have remained the same, except that it has increased in magnitude. - H. D. Harradon, Ter. Magn. Atm. Elec., vol. 50, No. 2, 1945, p. 168.

8218. Skillings' Mining Review. Complete Magnetic Survey for Florida Oil. Duluth, Minn., vol. 34, No. 18, 1945, p. 13.

The U. S. Bureau of Mines has completed a magnetic survey of the Florida peninsula. 2,300 observations were made, one each mile, along 16 traverses or suitable routes in an area of some 50,000 square miles. The survey showed possible indications of oil in lower Florida. (See also Geophys. Abs. 122, No. 8077). - V. S.

8219. Stephenson, E. L. Magnetometer Surveys on Black Sands of the Oregon Coast. Bureau of Mines, Washington, D. C., Rep. Inv. 3814, June 1945, 18 pp.

In 1942 the Division of Geophysical Exploration, U. S. Bureau of Mines, cooperating with the Oregon G.M.I. Department, made several magnetic surveys of the black sands on the southwestern coast of Oregon. These sands underlie Pleistocene raised marine terraces and contain gold, minerals of the platinum group, ilmenite, magnetite, garnet, zircon, and particularly chromite. Known deposits were developed during the war. The surveys aimed at determining the efficiency of magnetic methods in tracing and outlining these deposits and in prospecting for new ones.

Exploration covered the areas of Cape Blanco, Geiger mine, and the coast south of Cape Arago; The local geology, technical problems, field work, and data are described. The measurements revealed several positive anomalies which either located the black sand directly or allowed tracing of it. As a result, known deposits were brought to fuller light, and new deposits were discovered; findings warrant exploratory drilling. The conclusion is advanced that the magnetometer used in conjunction with topographic studies seemingly offers the quickest and most economical means of locating new deposits. - V. S.

8220. Thellier, E., and Thellier, O. Recherches géomagnétiques sur des coulées volcaniques d'Auvergne (Geomagnetic Research on Lava Flows in Auvergne). Ann. Geophys, Paris, vol. 1, No. 1, 1944, pp. 37-51.

The lava flows of Auvergne, France, were studied for the purpose of determining the direction of the geomagnetic field in the past. To devise a method, an inquiry was first made into the causes that could modify the initial magnetization of these flows. It pointed to the need of ascertaining the magnetic properties of corresponding rocks and checking on the uniformity of the lava's permanent magnetization. This approach was further applied in the field investigation of lava beds with a view to reconstructing the magnetic field at the time of flow. The beds selected were the apparently well-preserved Volvic bed and two basalt beds in a reverse condition. - V. S.

8221. Vestine, E. H., and Snyder, E. J. The Geographic Incidence of Aurora and Magnetic Disturbance, Southern Hemisphere. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 2, 1945, pp. 105-124.

In the present paper, average features of geomagnetic disturbance and aurora in south polar regions are compared with those derived on the basis of more extensive data for high northern latitudes. The seasonal and yearly average of the disturbance daily variation (S_p) is obtained for various stations in Antarctic regions, and its variation in amplitude with latitude is compared with that for the northern hemisphere. These data are used to estimate the position of the southern zone of maximum auroral frequency, and the result is compared with available yearly frequencies of aurora. A particular aim of the investigation is the clear indication of present deficiencies in observational data, both magnetic and auroral, and of the regions most in need of additional observations. - Author's abs.

3. SEISMIC METHODS

8222. Alcock, E. D. The Review and Analysis of Seismic Data. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 338-344.

It is proposed that separate departments be established for the review and analysis of seismic data. The functions of these departments would be to review and submit independent interpretations of current seismic data, to review old seismic data in the light of new geological and geophysical developments, to compile and prepare regional seismic maps, and to investigate areas in which seismic and geological data do not conform. This paper discusses the benefits to be expected from such a program, the source of man power, and the costs. - Author's abs.

8223. Bell, A. H., and Kline, V. Oil and Gas Development in Illinois in 1944. Illinois Geological Survey, Press Bulletin Series, No. 52, 1945, pp. 293-334.

A statistical analysis is made of Illinois oil and gas development in 1944. It includes a differentiation of the wildcats drilled according to methods used for locating them; among geophysical methods, only the seismic had been used. The percentages of successful wells are as follows: (1) Geology, 16.11; (2) seismograph, 22.85; (3) geology and seismograph, 19.04; (4) unscientific methods, 10.17. In all, 430 wells were drilled; 85 percent of the locations had been selected by geology and seismograph. The amount of seismographic work in terms of party-months was 33; this is a drop of 40 percent from the 1943 level. - V. S.

8224. Birkenhauer, H. F. A Study of House Vibrations from Quarry Blasts. Bull. Seism. Soc. America, Berkeley, Calif., vol. 35, No. 3, 1945, pp. 99-115.

During the last six years the geophysicists of St. Louis University, Mo., investigated the seismic effects of quarry blasts upon residential structures. The method consisted in recording simultaneously the vibrations of different parts of a building and comparing them with the vibrations of the surrounding medium. It was effected by means of a geophysical prospecting camera which has a bank of galvanometers mounted opposite a strip of photographic paper revolving on a drum; each galvanometer is connected to a geophone by an electric cable. The equation for the motion of the geophone, at first deduced theoretically, was confirmed empirically by geophone shaking-table and building-vibration experiments; its mathematical derivation is presented.

Geophone observations on different types of buildings were made during six quarry blasts. The seismograms and computed vertical-displacement curves are discussed. They show that seismic vibrations from quarry shots of normal size at normal distances are not destructive of houses; moreover, when one panel vibrates at resonant frequency, the motion of the building is neither greater nor more destructive than at other frequencies. - V. S.

8225. Demetrescu, G. Remarques sur le tremblement de terre de Roumanie du 10 novembre 1940 (Remarks on the Earthquake of November 10, 1940 in Rumania). Compt. rend., Acad. Sci. Roum., Bucharest, vol. 5, 1941, pp. 224-242.

The investigation is not complete because observations from the important Russian stations have not been available. The epicenter $45^{\circ}.8$ N $26^{\circ}.6$ E has been obtained by construction in conic projection; pairs of stations with approximately equal arrival times for P waves were used. It is in the Vrancea region, near the bend of the Carpathians. The longitude is not so well determined as the latitude, owing to lack of stations to the east. The P transmission times, as plotted against epicentral distance, lie close to a smooth curve. Comparison with the curves, of Gutenberg and Richter shows that the depth of the earthquake is between 100 km. and 200 km. Macro-seismically abnormal depth of the earthquake is indicated by the fact that it was felt with equal strength over wide areas. For other earthquakes in the same region, similar depths were found. The highest intensity observed

was X, according to the scale published by the Central Bureau of the Int. Seismol. Assos. Isoseists have been drawn for Rumania and Bulgaria; their shape is found to be largely influenced by geologic conditions, the isoseists gathering very closely to the northwest of the epicentre, in the bend of the Carpathians, and spreading widely in other directions. At Moscow, at a distance of about 1,300 km. to the northeast, the degree of intensity is still V-VI. - I. Lehmann, Ztrbl. Geophys., Meteorol. Geodas., vol. 10, No. 4, 1943, pp. 186-187.

8226. Frenkel, Ia. I. Regarding the Theory of Seismic and Seismo-Electrical Phenomena in Moist Ground (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 4, 1944, pp. 133-150.

The author applies seismic and seismo-electrical theory to moist ground treated as a porous body permeated by a continuous liquid. Equilibrium and motion in such a system are expressed by equations; two independent stress tensors are used for the solid skeleton and the liquid, and Darcy's law on the relationship between the flow of liquid and the resulting force of friction is modified to account for the compressibility of the solid body and for the forces of inertia in the case of irregular motion.

The linear equations of motion are further applied to seismic vibrations propagated in a moist ground in the form of longitudinal and transversal waves of small amplitude. A solution of these equations by successive approximations is discussed, and the first approximation, containing the first power of a small parameter characterizing the mobility of the liquid relative to the solid body, is worked out in detail. The velocity of propagation and the damping coefficient are also expressed mathematically; the latter is treated as a function of various parameters characterizing the structure and mechanical properties of the ground.

In conclusion, the general theory is applied to the electric vibrations associated with mechanical vibrations. These electric vibrations are generated by the differences between the velocities in the solid body and the velocities in the liquid; such differences produce changes in electro-kinetic potential at the surface of their contact. Refinements are made in the original calculations of the intensity of electric vibrations first developed by A. G. Ivanov, discoverer of the phenomenon. (English text in Jour. Phys., Moscow, vol. 8, No. 4, 1944, pp. 230-241). - V. S.

8227. Granet, Gaston. Sur la régularité des mouvements d'horlogerie destinés à entraîner les enregistreurs de séismographes (On the Regularity of Clock Movements Designed to Activate Seismograph Recorders). Annales de Géophysique, Paris, vol. 1, No. 1, 1944, pp. 95-97.

Clock mechanisms activating seismograph recorders must possess a strictly uniform movement. J. B. Macelwane investigated this movement in 1932 and detected brisk variations of velocity in several seismographs (Geophys. Abs. 46, No. 1222). The author reports on his similar study at the observatory of Puy-de-Dôme, France. He measured the length of 100 minute-intervals on the seismograms of different seismographs and also found irregularities.

The data are treated statistically and tabulated together with the findings of Macelwane. They show that the clock mechanisms of modern seismographs have a precision of about 0.20 sec. The mechanism Brillée used at Puy-de-Dôme can be, apparently, improved to give a precision of 0.1 sec. necessary for seismographs of short period. The synchronous motors are less precise than could be expected. - V. S.

8228. Gutenberg, B. Magnitude Determination for Deep-Focus Earthquakes. Bull. Seism. Soc. America, Berkeley, Calif., vol. 35, No. 3, 1945, pp. 117-130.

The magnitude of deep-focus earthquakes is so defined as to make the energy released in two shocks of the same magnitude equal, regardless of focal depth. Charts are given which, in connection with the equations for the magnitude of shallow shocks, permit the calculation of the magnitude of a shock at any given depth if the maximum ground amplitude and the corresponding wave period of P, PP, or S at a given epicentral distance are known.

It is found that the energies released in the longitudinal and transverse waves of an earthquake are about equal, regardless of focal depth. The "shadow zone" for P and S waves at epicentral distances near 10° , indicating a slight minimum in wave velocity at a depth near 100 km., has been confirmed, and quantitative results for amplitudes of P as a function of focal depth are given.

Earthquake magnitudes of 7.75 to 8.00 have been found throughout the range of focal depths, but, during the past 40 years, seem to have been relatively less frequent in deep-focus than in shallow shocks. In contrast with shallow shocks, no deep-focus earthquakes of magnitude 8.25 to 8.50 have been established thus far. This indicates (but does not yet prove) that at depth of about 100 to 700 km. roughly one-tenth as much energy can be stored as at depths of 15 to 40 km. At a depth of about 700 km. earthquake activity seems to stop abruptly.

The amplitudes of surface waves in deep-focus shocks decrease with increasing focal depth approximately as given by the theory. - Author's abs.

8229. Gutenberg, B., and Richter, C. F. Seismicity of the Earth (Supplementary Paper). Bull. Geol. Soc. America, Baltimore, Md., vol. 56, No. 6, 1945, pp. 603-668.

This paper supplements "Seismicity of the Earth" (Gutenberg and Richter, 1941). Additional epicenters for shallow and deep earthquakes are reported. Sixty-four great earthquakes are now identified for 1904-1943 and 201 major earthquakes for 1922-1943. New maps are given. Relative seismicity of active regions is discussed quantitatively (shallow shocks only). The Pacific belt has about 80 percent and the trans-Asiatic zone about 10 percent of the general activity. Earthquakes, volcanism, and gravity anomalies are discussed in their geographical and dynamical relation to structural arcs of Pacific type. These must be maintained by persistent processes in which subcrustal currents play a part. - Authors' abs.

8230. Jones, W. M. The Application of P-Difference Methods of Epicentral Determination to New Zealand Local Seismology. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 359-365.

Using the travel times of P-phases given for near earthquakes in the Jeffreys-Bullen 1940 tables, the differences in the times of arrival of the first impulses at the Wellington and New Plymouth and at the Wellington and Tui seismological stations are shown by series of curves, both for a surface focus and for a focus of depth 160 km. The variations with focal depth of the epicentral positions given by the intersections of such curves are discussed and a method considered of obtaining an epicentre from the records of four stations independent of focal depth. - Author's abs.

8231. Jones, W. M. : Determination of Epicentres in the South Pacific from Differences in the Arrival-Times of ScS. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 366-369.

The differences in the times of arrival of ScS at the Wellington and Suva and at the Wellington and Brisbane seismological observatories for earthquakes in the more important seismic region of the South Pacific are shown by series of curves for a surface focus. The positions of epicentres as determined by the intersections of such curves are not greatly affected by focal depth. - Author's abs.

8232. Kreis, Alfred. Die Beanspruchung des Gesteins in der Nähe von Sprengstellen (Rock Stresses Near a Blast). Verh. Schweiz. Naturforsch. Ges., Geneva, 1941, pp. 98-99.

A seismic study was made in mines on the relationship between rock stress and proximity to blasts. Two mine shafts near the power station at Innertkirchen, Switzerland, served for the investigation. Preliminary theoretical inquiry had demonstrated that the relation between the blast pressure and the shifts of rock particles would be affected by the distance to the blast; moreover, a phase displacement should take place because, in the vicinity of blasts, the pressure should decrease quicker than the amplitude of ground oscillations. The seismic measurements at the mines confirmed these deductions. - V. S.

8233. Lay, R. L. Repeated P-Waves in Seismic Exploration of Water-Covered Areas. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 467-471.

A secondary, and even a tertiary, P-wave has been observed under certain conditions in seismic exploration of water-covered areas. It is shown that these events are caused by an oscillation at the shot point. The procedure for eliminating these disturbing phenomena is described. - Author's abs.

8234. McComb, H. E., Gebhardt, R. E., and Wark, David. The Seismological Installation at the South Dakota State School of Mines and Technology, Rapid City, South Dakota. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 309-313.

The new seismological installation at the School of Mines and Technology, Rapid City, S. Dak., uses a standard Wood-Anderson Instrument with certain innovations. A special device deflects the vane for damping tests; it consists of a small nozzle inserted through the back of the seismometer case and connected by a flexible rubber tube to a standard medicine dropper which can be depressed by means of a hinged lever with a stop screw to a predetermined amount suitable for the test. Another feature is a flat-vane suspension of 1 x 8 x 25 mm. provided with a plano-parallel, front-surfaced mirror and a reflection mirror to increase the sensitivity. Still other improvements are described. Graphs show the results of damping tests, sensitivity tests, and decay-curve tests. - V. S.

8235. Mining Journal, London. Oil in Great Britain. Vol. 224, No. 5713, 1945, pp. 100-101.

A paper, "Geological Results of the Search for Oilfields in Great Britain," by G. M. Lees and A. H. Tait, is presented in condensed form. (see Geophys. Abs. 122, No. 8099; a brief review of this paper was also given in Bull. Am. Assoc. Petrol. Geol., vol. 29, No. 9, 1945, pp. 1353-1354). - V. S.

- Modriniak, N. A Preliminary Geophysical Survey of Part of the Whakatane District. New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 6B, 1945, pp. 327-331 (see abs. 8214 in this issue).

8236. Obert, Leonard, and Duvall, Wilbur. The Microseismic Method of Predicting Rock Failure in Underground Mining. Part 2: Laboratory Experiments. U. S. Bureau of Mines, Washington, D. C., Report of Investigations 3803, 1945, 14 pp.

A report is made of laboratory experiments on the origin of microseisms and the microseismic properties of various mine rocks. The total number of microseisms produced in the course of compressing a rock to failure was found to vary widely; coarse-grained rocks have generated, on the average, over a thousand microseisms, whereas the fine-grained rocks produced less than 200. Microseismic production depends largely upon the magnitude of the applied pressure. A part of production is also associated with the rate-of-change of pressure; this rate may be either negative or positive, the latter having the more pronounced effect. Moreover, some correlation can be established between total microseismic production and various characteristics of the rock. Other results are described. The data are insufficient for final conclusions. (For pt. 1 see Geophys. Abs. 121, No. 7978). - V. S.

Oil Weekly. Geophysical Reconnaissance Work Under Way in Oklahoma. Houston, Tex., vol. 118, No. 8, 1945, p. 45 (see abs. 8196 in this issue).

8237. Riznichenko, G. V. On Reciprocal Points in the Seismic Method of Reflections (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 2-3, 1944, pp. 87-92.

The author deals with the determination of the constant velocity of seismic waves propagated in conditions of a reflecting boundary of arbitrary form; hodographs of reflected waves recorded at two reciprocal positions of the shot point provide the data. A mathematical demonstration is given to prove that this problem has one definite solution. The two-dimensional case always possesses a single solution within certain limits of variability of the data when only reciprocal points are used. The three-dimensional case is soluble on the condition of a certain relationship between the data. For both these cases, formulas are deduced to determine the velocity of propagation; they are simple and can be applied in seismic exploration. - V. S.

8238. Robinson, W. B. Refraction Waves Reflected from a Fault Zone. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 535-545.

Many records of a reflection project in Webb County, Texas, displayed events showing excessive step-out times. These events are treated as refraction waves following a near-surface marker horizon, and their origin is shown to be associated with faulting, which was mapped by the ordinary reflections on the records. Possible confusion that may arise from failing to recognize these anomalous events is discussed, as well as the possibility of using the phenomenon to map faults. - Author's abs.

8239. Sánchez, P. C. Some Volcanological and Seismological Conclusions Regarding Mexico and Central America. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., 1944, pp. 316-318.

The author reviews volcanic activity in geological "Centro-America" extending from latitude 19° northward to Colombia. He finds that the present activity is only the remnant and final manifestation of the volcanism of the Miocene; all the volcanoes of Centro-America pass now through their last active phase. The causes of such decadence and the possibilities of future recrudescence are discussed. The view is advanced that volcanic and seismic phenomena arise from an isostatic lack of equilibrium, which produces movements of variable intensity in the internal magma. In a comment, N. H. Heck questions the early extinction of volcanic activity. - V. S.

8240. Schneiderov, A. J. Earthquakes on the Expanding Earth (Summary). Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. D., 1944, pp. 282-288.

The results of research concerning seismic prediction of earthquakes are outlined and the exponential law of gravitation and its seismological and tectonic effects developed (Geophys. Abs. 118, No. 7517). The discussion covers such subjects as atoms between planets, electrostatic and gravitational forces, perturbations caused in an electron-shell by a planet, liberation of shellar electrons, location of the expanding processes in the earth, inflation of the earth, and causes of earthquakes. The conclusion is reached that seismic prognosis of earthquakes should be based upon three methods. - geodetic, astronomical, and statistical; these are outlined briefly. The statistical method calculates from seismic records the average liberation of energy in a particular area; a lagging or advancing relative to this average furnishes data for a local prognosis. - V. S.

8241. Stulken, E. J. Effect of Ray Curvature Upon Seismic Interpretation. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 472-486.

With theory of seismic paths fairly well established, and with errors due to neglect of ray curvature considered in general terms or isolated examples by several authors, there remains a need for extended calculations measuring the effect of curvature. For a specific family of velocity functions, the inaccuracies of velocity computations based upon straight path assumptions are illustrated graphically. Discrepancies traceable to use of straight-line methods of depth, dip, and offset determination are likewise described.

Certain fallacies attending the application of simple curved path procedure to seismic prospecting are considered briefly, so that a reasonably fair evaluation of net importance of the ray curvature problem may be attempted. - Author's abs.

8242. Walter, E. J. An Extension of the Method of Numerical Integration of Seismograms to Include a Third Integration. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 2, 1945, pp. 71-79.

An abstract of this paper appeared in Transactions of the American Geophysical Union for 1944, pt. II, p. 289 (see Geophys. Abs. 122, No. 8110).

8243. Weatherby, B. B. Early Seismic Discoveries in Oklahoma. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 345-367.

Systematic seismic reflection shooting was begun on the Seminole Plateau of Oklahoma in 1927. In the beginning, the results were somewhat undependable; and well checks were disappointing. The various difficulties were gradually ironed out, so that with the discovery of South Earlsboro in 1929 and the North Extension of Carr City and West Seminole in 1950, new impetus was given to the use of the method. The history of these discoveries; together with maps and records, show the measure of success obtained at that time. - Author's abs.

4. ELECTRICAL METHODS

8244. Carreno, Alfonso de la. A New Development of the Theory and Application of the Potential-Drop-Ratio Method of Electrical Prospecting. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 575-584.

The author reviews the existing varieties of the potential-drop method and offers a new alternative, the "potential-drop ratio" method. In the latter, the intervals between electrodes A and C and C and B are different, and both increase according as the distance from C to E_1 is augmented; but the ratio r/a remains constant: $(r_0/a_0) = (r_1/a_1) = (r_2/a_2) = \dots = (r_n/a_n) = R$. This device permits the computation of a continuous curve of apparent resistivity under conditions of constant sensitivity; it is especially advantageous in vertical sounding. The author compares his method with the procedures of constant and expanding electrode separation; a mathematical treatment carries the comparisons in general terms and in application to the two-layer problem. General equations are discussed, special equations deduced for the potential-drop ratio, and graphs drawn to represent the variables. - V. S.

8245. Dahlberg, R. S., Jr. An Investigation of Natural Earth Currents. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 494-506.

An attempt was made to obtain relative apparent resistivities by measuring the potential gradients produced by natural earth currents. Alternating components in the range 0.5 to 10 cps. were measured.

The results of two surveys in Oklahoma are shown, and various perturbing factors are discussed. The conclusion is reached that the method is not likely to replace conventional resistivity methods. Author's abs.

8246. Enslin, J. F. Basins of Decomposition in Igneous Rocks: Their Importance as Underground Water Reservoirs and Their Location by the Electrical Resistivity Method. Trans. Geol. Soc. South Africa, Johannesburg, vol. 46, 1943, pp. 1 - 12.

Most of the extractable underground water in igneous formations is stored in the decomposed rock. Basins of decomposition can be located by the electrical resistivity method, and bore-hole sites can be selected accordingly. The electrical resistivity instrument and method are described briefly, and their application is illustrated by a discussion of some actual surveys. In addition, some statistics concerning the bore holes drilled in igneous rocks in South Africa are given. - Author's abs.

8247. Fritsch, Volker. Messverfahren der Funkmutung (Methods of Measurement in Radio Prospecting). Munchen and Berlin, Verlag von R. Oldenburg, 1943; published in the U.S.A. by Edwards Brothers, Inc., Ann Arbor, Mich., 1945, 220 pp. Price, \$5.85.

The techniques of measurement used in radio prospecting are described for the first time in organized, comprehensive book form. The author considers that theory and apparatus have achieved a development sufficient for practical application. He examines critically the evidence furnished by his experiments during the last 12 years. On this empirical basis are formulated the principles, problems, and assumptions of radio prospecting. The chief methods are described, such as absorption, frequency, reflection, compensation capacity, resistance, diagram, dielectrical constant, conductivity, radiation, and expansion. A discussion is devoted to sources of error. Finally, examples of application are given. A bibliography is appended. - V. S.

8248. Maher, J. C., and Jones, P. H. Ground-Water Exploration at Alexandria, Louisiana. Econ. Geol., Lancaster, Pa., vol. 40, No. 3, 1945, pp. 164-182.

The impending danger of a water shortage in Alexandria, La., has required the development of a new well-field in the Bayou Rapids area. Preparatory exploration in 1942 consisted of drilling, electric logging, testing of six experimental holes, etc. The electrical logs are discussed briefly with respect to underlying principles, self-potential and resistivity curves, and interpretation, with illustration by samples of curves. An analysis of logging results and other findings is aimed at clarifying local geology and determining the sites of wells. - V. S.

8249. Rama Rao, B. Annual Report for the Year 1941-42. Mysore Geological Department, Records, vol. 41, 1942; Bangalore, 1943, pp. 1-15.

An area of about 125 acres situated near Gonur-Gollarahatti and Guddadarangavvanahalli in the Chitaldrug district was surveyed by electrical methods. Measurements were made along 20 lines totaling 34,700 feet (or nearly $6\frac{1}{2}$ miles) in length; the number of determinations carried out was 485. In the area surveyed during the year no indications were found suggesting the occurrence of any concealed ore bodies.

8250. Schenk, Erwin. Über Lagebestimmungen steiler geologischer Grenzflächen im Untergrund durch Gleichstrommessungen (Concerning the Localization of Steep Geological Boundary-Surfaces in the Subsoil by Means of D.C. Measurements). Ztschr. pract. Geol., Halle, vol. 50, 1942, pp. 93-99.

Electrical exploration often deals with steep geological boundary surfaces. The problem and methods of determination are discussed in the case of D.C. measurements. The problem has three phases: Detecting the locus of the electrical disturbance, determining the strike and dip of the surface, and exploring the characteristics of the surface. The methods employed are horizontal sounding and vertical sounding; they are illustrated by several examples. Much prudence must be exercised in the interpretation of electrical disturbances because local inhomogeneities in the upper layers can be confused easily with boundary surfaces in the deeper subsoil. - V. S.

5. RADIOACTIVE METHODS

8251. Baranov, V. I., and Novitskaia, A. P. The Radioactivity of the Sungul Peat-Muds (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestia), Moscow, Sér. Géogr. Géophys., No. 3, 1943, pp. 173-180.

The radiochemical analyses of medical muds in the Soviet Union have shown on the average, a radium content of $n.10^{-11}$ and a thorium content of $n.10^{-40/0}$ (for dry mud). The peat muds of the health resort of Sungul, Siberia, must be noted for an exceptionally high content of radium, up to $n.10^{-90/0}$. Theoretically, the most probable causes for such concentration would be a high radium content in the waters washing the peats, a marked absorptive capacity of the peats for radium, and a considerable circulation of the water through the peats. All these conditions are found to exist in Sungul. - V. S.

8252. Blau, M., and Dreyfus, B. The Multiplier Photo-Tube in Radioactive Measurements. Rev. Sci. Instr., Lancaster, Pa., vol. 16, No. 9, 1945, pp. 245-248.

An improved method for the measurement of alpha-ray sources, using the luminescence of fluorescent screens, is described. The improvements consist of the use of a multiplier photo-tube and long-lived non-emanating alpha-standards. The chief advantage of the multiplier photo-tube is its great flexibility, allowing quite an extensive range of measurements. Alpha-ray sources ranging from $1/10$ A up to a few curies can thus be measured in quicker fashion than either the ionization or calorimetric method would permit. The standardization procedure of the photo-tube for measurements of absolute intensity is described in detail, the accuracy of the results being estimated at 5 percent. New applications of this method to the preparation of photometric standards and to the measurements of strong neutron sources are suggested. - Authors' abs.

8253. Bothe, W. Die Geigerschen Zählmethoden (The Geiger Counting Methods). Naturwiss., Berlin, vol. 30, 1942, pp. 593-599.

A brief outline is presented of the development of point counters and tube counters. Methods and applications are discussed. - V. S.

8254. Campbell, J. L. P. Radioactivity Logs Provide Vital Data for West Texas - New Mexico Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 3, 1945, pp. 4-9, 27, 34.

Radioactivity logging is in considerable use in west Texas and New Mexico. Technical difficulties here are due to the heterogeneity of local formations; moreover, in west Texas several hundred feet of salt must be traversed by the log. The equipment typically used comprises gamma-ray and neutron instruments. The first measures the relative intensities of natural

gamma rays from each formation; the second, the amount of hydrogen manifested at neutron-bombardment. The curves obtained are discussed with regard to their characteristics, complementariness, and advantages over electric logs. Their data have proved very valuable in well workovers, completions, secondary recoveries, etc. As illustrations, examples of correlation work in Fullerton field and Howard-Glasscock field are described and samples of logs shown. - V. S.

8255. Fearon, R. E. Radioactivity Well Logging; Part 1, Gamma Ray Measurements; Part 2, Neutron Bombardment of Formations. Oil Weekly, Houston, Tex., vol. 118, 1945, No. 1, pp. 33-42, No. 2, pp. 38-44.

The purpose of this series of two articles on radioactivity well logging is to remedy the lack of clear, comprehensive discussion of the important technical matters and the theory that pertains to this relatively new well-logging method. The series has been prepared to touch the "high spots" as concisely as possible, yet give sufficient understanding of the underlying theory and application objectives so as to enable readers better to comprehend the meaning of gamma-ray well logging. For a more complete treatment of radioactivity, readers are referred to the extensive references that accompany the articles. - Author's abs.

8256. Kovach, E. M. An Experimental Study of the Radon Content of Soil Gas. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. IV, Washington, D. C., 1945, pp. 563-571.

All the solid constituents of the earth have minute admixtures of radioactive substances and give off emanation. Accordingly, the soil gases that fill the capillaries of the earth must contain radon and thoron. The present study at Fordham, N. Y., seeks to establish a connection between the fluctuations of the soil's radon content and the variations of penetrating radiation from the ground studied by V. F. Hess. Three pipes were lowered into the ground to depths of 25, 75, and 150 cm. respectively. For 69 days the radon content of the soil gas was measured in these pipes simultaneously by means of an ionization apparatus. The following conclusions are drawn at this phase of the experiment: (1) Radon content in soil gas increases with freezing and decreases with water soaking of the ground; (2) dry ground produces stability within the three layers studied; radon content is found to increase with depth; and (3) atmospheric influences are secondary to the ground conditions of the soil. - V. S.

8257. Russell, W. L. Relation of Radioactivity, Organic Content, and Sedimentation. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 10, 1945, pp. 1470-1494.

A comparison between the radioactivity and organic content of 510 samples of sedimentary rocks indicates a marked relation between certain types of organic content and radioactivity. Marine oil shales are associated with

exceptionally high radioactivity, coals with abnormally low radioactivity, and other types of organic matter with intermediate radioactivities. An analysis of the material balance between sedimentary and igneous rocks indicates that the sediments should have about the same radioactivity as the igneous rocks from which they were derived; the averages of the writer's tests seem to confirm this conclusion if the igneous source of the sediments resembles a granite. An analysis of the data bearing on the radioactivity of deep-sea deposits and oil shales gives no evidence of general increase in radioactivity with slowness of deposition. The bearing of the new data on the origin of oil and of the helium in natural gas is discussed. - Author's abs.

8258. Velden, H. A. v. d., and Endt, P. M. On Some Fluctuation Problems Connected with the Counting of Impulses Produced by a Geiger-Müller Counter or Ionization Chamber. *Physica*, Hague, vol. 9, No. 7, 1942, pp. 641-657.

In the present article we shall deal with some quantities which are of importance in counting the kicks of a Geiger counter or ionization chamber arising from some constant or decaying radioactive source. We will first derive the sensibility and the statistical fluctuations of the counting-rate meter, using the direct method first indicated by Ornstein and a more classical method for one special case. We also wish to calculate some of these quantities for the case of a scaling set and a mechanical recorder with finite resolving powers. It is shown that in this case the fluctuations are greater (but not much) than in the case of infinite resolving powers. - Authors' abs.

6. GEOTHERMAL METHODS

8259. Kovner, S. S. On the Theory of Thermal Prospecting: Artinskian Massif Revealed on the Slope of a Gravitational Maximum. *Compt. rend. (Doklady) Acad. Sci. U.R.S.S.*, Moscow, vol. 42, No. 6, 1944, pp. 262-264.

Artinskian limestone domes are not uncommon in some regions of Second Baku, middle Volga. The author previously showed that geothermal surveys can detect them (*Geophys. Abs.* 115, No. 7188). He now analyses an Artinskian structure situated on the slope of a gravity high. It is known to lie at a depth of 1,200 m. and has Kungurian salt 800 m. thick on one limb and Ufa redstone on the other limb; the Ufa deposits also cover the salt and cause the anomaly. Coefficients of heat conduction for these rocks were taken from the work of Kolesnikov (op. cit.); the figures are cited. They served for calculating the thermal fields of two cross sections, one through the dome and the other outside of it. A normal mean geothermal step of 3° C. per 100 m. was assumed, with temperatures equal to zero at the surface and to 48° C. at the depth of 1,600 m. Computations followed the method of nets applied to the Dirichlet-Neuman problem for the profiles (*Geophys. Abs.* 114, No. 7066; 115, Nos. 7188, 7189).

The thermal curves obtained revealed marked temperature differences between the two cross sections, both for depths of 100 m. and 200 m. Curves plotted of differences repeated the configuration of the dome; in the curves for 100 m. the high was 0.54°C. , for 200 m., 1.13°C. , and both corresponded to the apex of the dome situated 400 m. below. It is concluded that geothermal measurements can detect Artinskian domes; gravitational, seismic, and electrical methods meet with difficulties. - V. S.

8260. Kraskovsky, S. A. Measurements of Temperature in Salt Mines (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestia), Moscow, Sér. Géogr. Géophys., No. 3, 1943, pp. 134-142.

In 1940 the author measured the temperature in Russian salt mines with a view to developing a method for geothermal studies. A mercury thermometer was used, with its bulb wrapped in rubber and wool to increase thermal inertia. The surveys included laboratory research. (1) It was found that thermometers required the following exposure for registering the temperature of the surrounding medium: 70 min. in the air, 52 min. in dry sand, and 60 min. in salt within a sample hole. The problem and methodology of the retardation constant are discussed. (2) The thermal coefficients were determined on two specimens of salt by the method of constant conditions. These coefficients, particularly thermal conductivity, enabled the author to compute the time during which a certain change occurs in the temperature of a given point and the velocity with which a given temperature propagates to a certain depth in the salt; the calculations are given and the results tabulated. No thermal gradients were determined, because the shafts could not be bored. - V. S.

7. GEOCHEMICAL METHODS

8261. West, S. S. The Relative Abundance of the Carbon Isotopes in Petroleum. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 406-420.

The relative abundance of the isotopes of carbon has been measured in samples of oil and gas from 32 wells in the Silica and Ellinwood fields of Barton and Rice Counties, Kansas, and 3 wells in Oklahoma, Texas, and Wyoming, as well as in surface vegetation, hydrocarbons from well cuttings, and carbon dioxide absorbed from soil. For the samples from Silica and Ellinwood Fields, $\text{C}^{12}/\text{C}^{13} = 94.1 \pm 0.4$. Relative abundance appears to be independent of the source of petroleum, but is about 1.6 percent lower for vegetation. It is concluded that this quantity cannot be used to distinguish sources of petroleum, and that its use to determine the origin of soil hydrocarbons requires an accuracy of measurement not hitherto attainable. - Author's abs.

8262. Wilson, H. D. B. Geochemical Studies of the Epithermal Deposits at Goldfield, Nevada. Balch Graduate School of the Geological Sciences, California Institute of Technology, Pasadena, Contr. 354; also Econ. Geol., Lancaster, Pa., vol. 39, No. 1, 1944, pp. 37-55.

Approximately 50 samples of vein material and wallrock from the ore deposits of Goldfield, Nev., were quantitatively analyzed by means of the spectrograph to determine whether the quantitative distribution of certain elements would give some clue to the loci of mineralization. It has been established that three elements, bismuth, silver, and tin, are genetically associated with gold values in the deeper veins. These elements are determinable even in very low-grade vein material. - Author's abs.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

8263. Brant, A. A. Review of Geophysical Work Carried Out by the Ontario Department of Mines, 1937-1944. Ontario Dept. Min., mimeo. report, Nov. 15, 1944, 5 pp. (deposited in the Geological Survey Library, Washington, D. C.)

This paper was subsequently printed anonymously, under a modified title, in Northern Miner, vol. 30, No. 39, 1944, p. 11 (see Geophys. Abs., 120, No. 7891). A review appeared later in Bull. Imp. Inst., vol. 43, No. 2, 1945, pp. 133-136. - V. S.

8264. Gross, H. E. Marine Petroleum Possibilities. Petrol. Eng., Dallas, Tex., vol. 16, No. 11, 1945, pp. 76-82.

The continental shelf has recently attracted considerable attention because of its petroleum potentialities. The author discusses these with the aid of his maps. (1) A map of the entire world shows that continental shelves run out as far as 150 miles offshore without becoming deeper than 600 feet. They aggregate an area approximating the size of the United States. Tentative geological estimates have indicated that this territory could yield the same ultimate production of about 50 billion barrels of petroleum. The prospective drilling areas are largest in the U.S.S.R. and smallest about Lake Erie. (2) Two maps of the Great Lakes in North America show the surrounding oil and gas fields. The geology of the lakes is discussed. Four localities appear promising for under-water prospecting: Western end of Lake Erie, northwest half of Saginaw Bay, east side of Lake Michigan between Benton Harbor and Ludington, and shallow south end of Lake Huron. - V. S.

8265. Grossi, Mario. Considerazioni geologiche e geofisiche sui giacimenti metaniferi (Geological and Geophysical Considerations Regarding Deposits of Methane). Metano, vol. 4, No. 14, 1942, pp. 13-23.

Methane deposits have often been found near oil fields. These accumulations are also usually located in the fractured zones of the earth's crust typified by fissures, faults, and volcanoes. Inversely, fractured zones appear to be geologically related to oil and gas accumulations; marked similarities exist between oil and gas regions and fractured regions. This close relationship leads the author to conclude that oil and gas should be sought in fractured zones. Such geology is in itself favorable to processes of accumulation. - V. S.

8266. Illing, V. C. Role of Stratigraphy in Oil Discovery. Oil Gas Jour., Tulsa, Okla., vol. 44, No. 16, 1945, pp. 125-129.

The author outlines his address delivered at a meeting of the A.A.P.G. at Tulsa, Okla., in March 1945 and published in full in the Bull. Am. Assoc. Petrol. Geol., vol. 29, No. 7, 1945, pp. 872-884 (see Geophys. Abs. 122, No. 8145).

8267. Krumbein, W. C. Recent Sedimentation and the Search for Petroleum. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 9, 1945, pp. 1233-1261.

The thesis of this paper is that sedimentary characteristics will become increasingly important in the search for oil. Emphasis is placed on the increase in quantification of sedimentary data, new and more complete studies of sedimentary environments, application of the techniques to ancient sediments, and the development and improvement of methods for recording the quantitative data in map form. A brief review is given of some trends in modern sedimentation, illustrated by particle roundness and sphericity, as an introduction to quantitative sedimentary studies. The viewpoint is extended to environments of sedimentation approached as "closed systems" with boundary conditions, materials, and energy sources as the basic subjects of study. The data of quantitative environmental studies lend themselves to presentation on contour-type maps and surfaces, and some of the geometrical properties of such maps and surfaces are reviewed. A classification of maps is given, to indicate the wide range of sedimentary data both recent and ancient, suitable for presentation in this manner. - Author's abs.

8268. Krynine, P. D. Sediments and the Search for Oil. Pennsylvania State College, Mineral Industries Experiment Station, Tech. Paper 101, 1945, 9 pp. Price, 10 cents.

Oil deposits of the petrologic type, or stratigraphic traps, predominate in Pennsylvania. To find a method for detecting them, the author investigated the origin and composition of sediments. His findings show that sediments are mechanical mixtures of chemical and detrital fractions. The detrital fraction is formed along a triple line of descent, producing the series of orthoquartzite limestones, graywackes, and arkoses. During each diastrophic stage a balance exists between the formative processes, and an average normal sediment is formed. If, however, some of the formative processes become excessive, abnormal sediments result; these are termed differentiation end-phase concentrates.

Significantly, the investigation also revealed that the reservoir rocks of oil fields are not normal quartzites, graywackes, or arkoses but end-phase concentrates within these series. The author concludes that there exist two varieties of oil concentration: (1) A final concentration within a structural high, and (2) a preliminary concentration during an earlier petrologic stage in amounts sufficient to make final concentration possible but conducive to abnormal sedimentation of the end-phase type. The latter phenomenon offers a possible guide for detecting stratigraphic traps. End-phase concentrates can serve as diagnostic criteria in oil surveys assaying and following petrologic gradients toward regions of maximum development. - V. S.

8269. Lahee, F. H. *Exploratory Drilling in 1944*. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 6, 1945, pp. 629-645.

This review of exploratory drilling for oil during 1944 includes references to the role of geophysical surveys. The productive and dry wildcats in the United States, when grouped under the methods by which they were located, gave the following totals: (1) Geology: prod. 596, dry 2,094; (2) geophysics: prod. 146, dry 650; (3) geology and geophysics: prod. 102, dry 263; (4) sundry nontechnical: prod. 90, dry 735; (5) unknown: prod. 10, dry 110; and (6) totals: prod. 944, dry 3,852; grand total: 4,796. These figures show that 21.9 percent of the holes drilled on technical advice were productive, as contrasted with 10.9 percent productive in the case of the holes located without such advice. (See also Geophys. Abs. 121, No. 8014).
- V. S.

8270. Magnée, I. de. *Progrès récents de la prospection géophysique et possibilités d'application au Congo Belge* (Recent Advances of Geophysical Exploration and Possibilities of Application in the Belgian Congo). Ciel et Terre, Brussels, vol. 57, Nos. 9-10, 1941, 22 pp.

The nature of gravimetric, seismic, magnetic, and electrical methods is explained briefly. In Belgium the magnetic method was largely predominant. Prospecting suitable for detecting minerals has possibilities in the Belgian Congo. Already the Schlumberger methods have been applied to copper deposits, and magnetic and electric methods to gold deposits. It must be recognized, however, that the geology of the Congo is not very favorable for geophysical exploration. Moreover, up to the present most prospecting has centered on superficial alluvial deposits of gold, ethane, and diamonds, for which the applications are necessarily limited. Only certain large placers, still little known and ill-accessible to boring, would give opportunities to magnetic and electrical methods; seismic reflection is handicapped by shallowness. Thus, the best chances seem to lie in the discovery and detailed circumscription of the numerous deep deposits, though the difficulties are considerable. - V. S.

8271. McTee, A. R. *The War's Influence on Geophysics*. Oil Weekly, Houston, Tex., vol. 119, No. 2, 1945, pp. 59-60.

The scientific discoveries of the war period are generally expected to produce marked advances in geophysical exploration. To clarify these prospects the author made a survey among geophysicists, manufacturers of equipment; and operators of instruments. They anticipate some gains in techniques and apparatus, but no revolutionary changes. The radar wave lengths now in use are unlikely to have sufficient penetrating power for direct application in oil prospecting. But related electronic research should improve seismic, gravimetric, and magnetic instruments. Magnetometers suitable for airplane surveying will be constructed, and wide use of airplanes for exploration should follow. Gravimeters will be reduced in weight; already a 28-pound model has been announced. The Gulf Co. is perfecting an underwater gravimeter promising expansion of under-water exploration. Geothermal principles also receive attention; a method of prospecting based upon differences in local thermal conductivity undergoes tests on the Gulf Coast.
- V. S.

8272. Montana Oil and Mining Journal. Wyoming Has 57 Geophysical Crews Working in Oil Areas. Great Falls, Mont., vol. 25, No. 18, 1945, p. 1.

Predictions that a new record would be set this season in geophysical exploration in Wyoming oil fields already have been vindicated by activities now underway. The prospects are bright that a new high will be reached before the end of the summer, according to a late check of major oil-company operations. A survey shows no less than 57 crews engaged in such work at the present time, including seismograph, gravity-meter, and core-drilling crews. The work extends to all parts of the State. The peak of activity will be reached late in the summer or early fall, it is believed.

8273. National Petroleum News, Cleveland, Ohio. Truman Claims Continental Shelf Oil for United States. Vol. 37, No. 40, 1945, p. 36.

A proclamation has been issued by the President of the United States to establish federal jurisdiction over the country's continental shelf beyond the 3-mile limit. The continental shelf is generally defined as land beneath the high seas contiguous to the continent and covered by water to a depth of not more than 600 feet. In the United States it ranges in width from 60 to 250 miles on the east coast, narrows south to Florida, expands considerably in the Gulf of Mexico, and falls off to its narrowest width on the west coast; the total area is 750,000 square miles. The Bureau of Mines, Geological Survey, and Land Office have investigated the geology of the shelf for more than 3 years and reported petroleum and other mineral resources under many parts; utilization is regarded already practicable with modern technology. An executive order accompanying the proclamation places the continental shelf under the administration of the Secretary of the Interior. The proclamation and the order do not affect States' rights. - V. S.

8274. Oil News. Three Geophysical Survey Crews Busy in San Juan Basin. O. N., Albuquerque, New Mexico, vol. 21, No. 6, 1945, p. 3.

Three geophysical crews are reported working in the San Juan Basin of northwestern New Mexico at this time. The Phillips Petroleum Co. has a seismograph outfit working in the Blanco sector east of the Mansfield properties. The Magnolia Petroleum Co. also is said to have a seismograph crew working in various sections of the basin. The Southern Union Production Co. is employing gravity-meter crews, who are working the gas belt from the Ute Pasture on southeast through Fulcher Basin and into the Kutz Canon areas. A number of deep explorations are scheduled for early starts in the San Juan country. It is in the deeper zones that the big pay off is most certain to be found, operators believe.

8275. Petroleum Times. Anglo-American Oil Company's Part in British Oil Search. London, vol. 49, No. 1,248, 1945, pp. 382-385, 406.

The Anglo-American Oil Co. has been engaged in oil exploration on the British Isles for 10 years; it has held at one time or another petroleum prospecting licences over 4,814 square miles of territory. The history of operations and the results of drilling are described. The exploratory methods employed have included geological surface and subsurface mapping and magnetic, gravimetric, seismic, and geochemical surveying, the latter in Cheshire, Lancashire, Carlisle, and much of Yorkshire and Nottinghamshire, where oil beds are completely hidden under a thick cover of strata. The vertical magnetic component was measured over 2,200 square miles in the eastern Midlands. The static gravimeter occupied over 15,000 square miles, of which 5,500 were covered with stations every $1\frac{1}{2}$ square miles. Seismic refraction and reflection surveys were made, respectively, by the D'Arcy Exploration Co. and a crew from the United States; further seismic surveying is planned with the assistance of American technicians. The geochemical method was used over an area of 140 square miles but has been discontinued. - V. S.

8276. Petroleum World. Fluorescence in Oil Exploration. Los Angeles, Calif., vol. 42, No. 7, 1945, pp. 58-59.

Fluorescence effects can be utilized in oil exploration. Petroleum oils show a green glow under the ultraviolet light and may be identified and located through it. The various techniques are described. In the case of test wells, the core samples, friable earth, mud, etc., must be examined in an apparatus equipped with ultraviolet light. In field prospecting, the selected localities are searched with an ultraviolet lamp. This lamp may be a quartz-mercury arc type with short wave releasing light at 2,537 Angstroms, or a "near ultraviolet" type. A special glass filter lets through only the invisible ultraviolet rays and suppresses visible light generated by the lamp. To detect oil, the material tested must be compared with assortments of petroleum samples of known fluorescence; several techniques can be used. Particulars of the fluoresce method will be found in J. De Ment's paper "Fluorochemistry in Petroleum Service". - V. S.

8277. Roberts, John. Rock Disturbance in Relation to Economics and World Policy. Petroleum Times, London, vol. 49, No. 1,254, 1945, pp. 652-656.

The origin of oil is discussed with a view to advancing oil exploration. The author's theory of metamorphic distillation holds that oil is a product generated by the action of frictional heat upon organic substances in mountain rocks. The requisite conditions are: (1) Primary deposit capable of yielding oil-producing volatiles; (2) source of heat; (3) porous-rock reservoir at distance sufficient for condensation of volatiles; and (4) impervious cover preventing escape of hydrocarbons.

Accordingly, oil would be found in fractured zones where heat had been intense at one time. The local natural pyrometers, such as the metamorphosed rocks, anthracite and marble, should indicate the former condition of a zone and show how adequate it was for oil formation. Examples supporting this theory are found in the oil fields of Italy, Venezuela, California, Pennsylvania, Galicia, Rumania, Caucasus, and Iran; some of them are discussed briefly. - V. S.

8278. Rust, W. M., Jr., Evaluation of New Geophysical Methods. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 7, 1945, pp. 865-871. Also: Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 329-337.

This paper was published under a similar title in the Oil Weekly, Houston, Tex., vol. 117, No. 6, 1945, pp. 56-57, 70 (see Geophys. Abs. 121, No. 8022). - V. S.

8279. Short, E. H., Jr. Directional Drilling Used as Exploratory Tool in Gulf Coast Well. Oil Gas Jour., Tulsa, Okla., vol. 44, No. 18, 1944, pp. 111-113.

This article describes a recent application of directional drilling as a means of subsurface exploration. Although the productive horizon sought was penetrated on the second attempt, this particular case illustrates the possibilities in this type of work. - Author's abs.

8280. Thratsoo, E. N. Future Trends in Oil Finding. Petroleum, London, vol. 8, No. 9, 1945, p. 177.

Efforts toward perfecting geophysical exploration for oil should be directed along two lines: Structural methods must be improved in range and sensitivity to detect the smallest structures, and all possible procedures must be furthered for discovering oil independently of structure. In the latter class belong geochemical, electrical resistivity, and radioactive methods. These are described briefly, with emphasis on preparatory geological diagnosis. Further, statistics are given on the effectiveness of different methods. The successful wildcats of 1942 in central Texas, when differentiated according to methods used for locating them, constituted the following percentages of the grand total drilled in that year: (1) Random drilling, 8 percent productive; (2) surface geology, 10 percent; (3) subsurface geology, 30 percent; (4) seismograph, 36 percent; (5) geochemical, 3 percent; and (6) combination of above methods, 13 percent. - V. S.

8281. Todd, J. D. Mississippi, Where Persistence Pays. Oil Weekly, Houston, Texas, vol. 118, No. 7, 1945, pp. 49-52.

A traveler's observations on the rise of gravity, seismic, and electric logging methods in Mississippi are presented and examples of perfected approaches and techniques cited. (1) Gravity surveys have become particularly popular here after the remarkable successes of Gulf Refining work. They are now the common method of evaluating all current prospects. Experience has shown, however, that surveying must be denser; the new surveys use stations a half and even a third of a mile apart, so as to uncover all weaker anomalies. (2) Seismic surveys are employed in conjunction with gravity work, in keeping with the Gulf coast practice "localize with gravimeter and check with seismograph." Good results can be obtained in most of southern Mississippi. Improved procedures have been developed for local problems. The seismograph must still be considered the best oil-finding tool, though failures are many.

(3) Electric logs prove very valuable for correlation, but they are insufficient for diagnosing uncored sand; only sizable cores can provide a basis for conclusions. Every promising section should be at least sidewall-sampled.
- V. S.

8282. Weaver, C. E. Geology of Oregon and Washington and Its Relation to Occurrence of Oil and Gas. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 10, 1945, pp. 1377-1415.

The States of Oregon and Washington comprise several topographic provinces, each with distinctive geological features. These provinces are described; attention is devoted to the crustal movements of late Miocene and the upwarps and downfolds at the close of Pliocene. Indications of oil have been found in the form of very small seepages in the Tertiary formations west of the Cascade Mountains. No conclusive evidence exists here of commercial amounts, but drilling tests would appear justifiable. The metamorphic rocks, granites, lavas, and continental sediments in eastern Oregon and Washington and the northern Cascade Mountains are considered unfavorable for a commercial occurrence of oil. - V. S.

8283. Whitcroft, T. H. Future Activities in Deep-Sea Surveying. Nat. Research Council, Am. Geophys. Union, Trans. 1944, part IV, Washington, D. C., 1945, pp. 610-613.

The author discusses the principal problems facing exploration of ocean basins: (1) Obtaining the necessary soundings; (2) evolving a more uniform method of correlating and publishing them on an international basis; and (3) agreeing upon a more suitable means for graphically representing these soundings. - V. S.

8284. Zanetta, A. J. La investigación y la industria petrolífera (Research and the Petroleum Industry). Bol. de Min. y Petrol., Mexico, vol. 16, No. 6, 1945, pp. 32-34.

An abridged version of the paper published in Boletín de Informaciones Petroleras, Buenos Aires, vol. 21, No. 241, 1944, pp. 11-30 (see Geophys. Abs. 121, No. 8025).

8285. Zirbel, N. N. A Method of Determining Dip, Strike, and Impact Point for Steeply Dipping Beds. (abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 455.

A method of determining the dip, strike, and impact point for steeply dipping beds which is considered simple enough for use in normal field computation is described.

10. PATENTS

8286. Method and Apparatus for Dynamic Measurement of Borehole Radioactivity. Shelley Krasnow, New York, N. Y. U.S. Patent 2,371,628, issued March 20, 1945.

In an apparatus for obtaining information concerning conditions within a bore hole, means insertable within the bore hole, and responsive to radioactive rays originating within the bore hole, means to measure the time derivative of response of the first-named means, means at the surface of the earth to record the said time derivative, and means to indicate the position of the first-named means, the said indicated time derivative and indicated position serving to enable the correlation between radioactive properties and position within the borehole. - Claims allowed, 24.

8287. Method of Prospecting for Buried Deposits. Eugene McDermott, Dallas, Tex. U.S. Patent 2,371,637, issued March 20, 1945.

In the art of exploring for buried oil or gas deposits from which leakage occurs, the method of prospecting for the location of such deposits, which comprises taking a soil sample from each of a plurality of points spaced a predetermined distance apart over a predetermined area of the earth's surface at depths depending upon local conditions and sufficient to obtain soil not materially affected by excessive drainage, weathering, or leaching, heating the samples, substantially free from vegetable-matter carbon and containing other less readily combustible carbon matter found in said soil, in the presence of oxidizing gas containing free oxygen, and converting to carbon dioxide by the resulting combustion substantially only, said less readily combustible carbon matter in a measurable quantity in a sample, and determining substantially only carbon so converted, whereby valuable information is obtained concerning the location of said buried oil or gas deposits. - Claims allowed, 11.

8288. Method and Apparatus for Determining Current Flow in Borehole Casing or the Like. W. H. Stewart, Beaumont, Tex., assignor to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey. U.S. Patent 2,371,658, issued March 20, 1945.

The method of determining the flow to and from a casing located in a bore hole of earth currents due to galvanic action or sources remote from the casing, comprising lowering into the casing means for producing a flow of current along the casing between spaced points in the interior of the casing from an artificial current source, while the only other sources of current flow in the casing are those causing said earth currents of galvanic or remote origin, adjusting said source to attain a condition of no current flow between said spaced points, and determining the current introduced from said source when said condition is attained. - Claims allowed, 3.

8289. Geophysical Prospecting Apparatus. J. P. Minton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,371,973, issued March 20, 1945.

A device for detecting seismic waves, comprising an armature formed of a plurality of laminations of a material having high magnetic permeability and low residual magnetism, a rigid frame having spaced portions, means for rigidly securing opposite ends of said armature to said spaced portions with said armature disposed in a horizontal position and movable vertically by application of seismic waves to said frame, an inertia assembly including a pair of E-shaped cores formed of a plurality of laminations of a material having high permeability and low residual magnetism, said assembly including spring means supporting one of said cores on the upper side of said armature and the other of said cores on the lower side of said armature with very narrow air gaps between each leg of each core and said armature and with the laminations thereof parallel to those of said armature, said spring means having characteristics such as to eliminate movement of said cores upon application of said seismic waves to said frame, said assembly including a coil encircling each of said cores, said narrow air gaps being of the order of ten thousandths of an inch for producing operation on the steeper slope of the characteristic curve between inductance and air gap, so that upon relatively minute movements between said cores and said armature produced by said seismic waves there occurs a substantial change in inductance of one coil in one direction and simultaneously a substantial change of inductance in the other coil in the opposite direction, said armature and said cores providing for bodily vertical movement by said seismic waves of said armature simultaneously and substantially uniformly to change the air gaps between the said legs of each of said cores and said armature. - Claims allowed, 1.

8290. Method and Apparatus for Recording Seismic Waves. R. A. Broding, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,372,056, issued March 20, 1945.

A method of detecting and recording seismic waves that comprises generating an electrical carrier current wave of a frequency higher than that of the seismic waves to be detected, modulating said carrier wave in accordance with said seismic waves by varying the tuned resonance of two circuits such that one circuit approaches resonance while the other departs farther from it, rectifying the voltages induced in the two circuits by half-wave rectifiers which pass different half waves in the two circuits, adding algebraically the two rectified voltages, eliminating the carrier wave, and amplifying and recording the resultant signal. - Claims allowed, 9.

8291. Pivot for Gravity Meters. D. H. Clewell, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,372,252, issued March 27, 1945.

In a gravity meter having a housing, a mass structure disposed within the housing, pivoting means for mounting the mass structure for rotation in a vertical plane, elastic means for balancing the gravity moment of the mass structure, a support for the pivoting means, said pivoting means comprising a relatively heavy leaf spring secured at its midpoint to the support, a pair of light leaf springs disposed in parallel relationship to each other and having an end of each secured to opposite ends of the relatively heavy leaf spring, clamping means carried by the mass structure adapted to receive the free ends of the light leaf springs to effect a frictionless pivot for the mass structure, whereby excessive stresses imparted to the light leaf springs will in part be absorbed by the relatively heavy leaf spring. - Claims allowed, 3.

8292. Analytical System. D. D. Taylor, Altadena, Calif., assignor to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,373,151, issued April 10, 1945.

In analyzing a mixture containing a plurality of components with respect to one component, the method which comprises ionizing a sample of said mixture at such a predetermined ionization voltage that ions of a selected mass-to-charge ratio which may be formed from each of said components at some ionization voltage are actually formed from only said one component, ionizing at the same voltage a reference sample containing a known amount of said one component, measuring the amounts of said ions formed from both said samples, and determining from said measurements the quantity of said one component present in the mixture, - Claims allowed, 4.

8293. Automatic Volume Control Circuit, F. J. Faltico, Minneapolis, Minn., assignor to The Maico Co., Inc., Minneapolis, Minn. U. S. Patent 2,373,180, issued April 10, 1945.

In a multiple-stage electronic amplifier system in which one stage preceding the final stage employs an electronic amplifier having, in addition to the usual cathode, plate, and control grid, another grid, which when electrically charged will modify the flow of electrons from said cathode to said plate, the said other grid of said preceding stage amplifier being connected as an anode in an output circuit that is connected to the input circuit of the succeeding stage in the manner usually assigned to a plate, and having impressed thereon a positive D. C. potential of predetermined value, whereby the said electronic amplifier of the preceding stage and the amplifier system as an entirety will function normally, except for automatic volume control action, independently of the plate of said preceding stage amplifier, means feeding back signal voltage from the output of a succeeding stage to the plate of said electronic amplifier of the preceding stage, whereby rectification will take place between the plate and cathode of said preceding stage amplifier when, but only when, peak values of positive signal voltage exceed the positive D. C. potential impressed upon the said other grid of the preceding stage amplifier, and means for applying a predetermined percentage of the negative D. C. voltage available at the said plate as a result of rectification to the control grid of an electronic amplifier of the said system to serve as a volume suppressing bias. - Claims allowed, 21.

8294. Signal Recording and Reproducing Method. G. C. Sziklai, Bloomington, Ind., assignor to Radio Corporation of America, a corporation of Delaware. U. S. Patent 2,373,273, issued April 10, 1945.

The method of recording signals, which comprises subjecting successive portions of an electro-conductive material to the action of a second material, which is adapted to react therewith chemically under the influence of an electrical potential to form a dielectric coating thereon while applying thereto a varying potential representative of said signals whereby to form on said first-named material a dielectric coating of varying thickness representative of said signals. - Claims allowed, 8.

8295. Method and Apparatus for Moisture Measurement of Materials. Hyman Olken, Washington, D. C. U. S. Patent 2,373,846, issued April 17, 1945.

Means for measuring the conductivity of a material comprising a container having one side as a shearing plate, a plurality of electrodes forming condenser plates positioned on the external face of said shearing plate, and a measuring circuit for measuring the apparent capacity of the condenser so formed, means providing said condenser with dimensional values and insulating the electrodes thereof, whereby the conductivity and capacity have a straight-line relationship with each other. - Claims allowed, 4.

8296. Surveying Instrument. Leo Ranney, McConnelville, Ohio. U. S. Patent 2,373,976, issued April 17, 1945.

A surveying apparatus for apertures such as oil and gas wells, comprising an elongated casing adapted to be introduced into such an aperture in alignment therewith and having a liquid delivery passage extending longitudinally therethrough, a removable container located within said casing in a fixed position with relation thereto, a self-adjusting direction-indicating device located in said container, a pressure-responsive piston located within said passage and movable in response to pressure applied thereto, a fluid pressure-responsive element located within said container for locking said device in a fixed position, and a plunger actuated by said piston to increase the fluid pressure within said container and thereby actuate said element to lock said device against motion relatively to said container. - Claims allowed, 10.

8297. Geochemical Surveying. E. E. Roper, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,374,135, issued April 17, 1945.

Apparatus for geochemical surveying comprising a molecular still for desorbing hydrocarbons from a soil sample, at least one trap connected to said molecular still for trapping hydrocarbons desorbed from said soil sample, means connected with said molecular still and with said trap for

evacuating said molecular still and said trap, a sample reservoir for light hydrocarbons, said sample reservoir being connected with said trap, means for passing a hydrocarbon-free gas through said trap and into said reservoir to transfer hydrocarbons from said trap to said reservoir, an additional trap alternatively connected with said molecular still, means connected with said additional trap and with said molecular still for further evacuating said molecular still and similarly evacuating said additional trap, a second sample reservoir for heavy hydrocarbons, and means connected with said additional trap and with said second sample reservoir for passing a hydrocarbon-free gas through said additional trap and into said second sample reservoir. - Claims allowed, 5.

8298. Borehole Logging Method and Apparatus. D. G. C. Hare, New York, N. Y., assignor to Texaco Development Corp., New York, N. Y., a corporation of Delaware. U.S. Patent 2,374,197, issued April 24, 1945.

The method of forming a well hole which comprises operating a cutting tool so as to penetrate the earth formations, simultaneously measuring the natural radiation of the formation in the immediate vicinity of the cutting tool as the hole is formed, said radiation reaching the hole from all directions in planes intersecting that portion of the well hole in said vicinity, and correlating variations in radioactivity detected with the depth of the cutting tool in the hole. - Claims allowed, 7.

8299. Apparatus for Recording Seismic Waves. Herbert Hoover, Jr., Sierra Madre, Calif., assignor, by mesne assignments, to United Geophysical Co., Pasadena, Calif., a corporation of California. U.S. Patent 2,374,204, issued April 24, 1945.

An apparatus for seismic prospecting, a seismic wave receptor adapted to convert into electric waves a seismic wave train, an amplifier connected to the receptor and including a grid-type gain-control element, and gain-control means connected to said element to vary the gain of the amplifier as a function of two independent electrical parameters, the constants of the gain-control means being coordinated to vary one of the parameters solely as a predetermined function of the time elapsing since the reception of the first portion of the wave train, and to independently and simultaneously vary the other parameter as a function of signal strength of said amplifier. - Claims allowed, 7.

8300. Geochemical Prospecting System. H. E. Metcalf, San Francisco, Calif., assignor, by mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U.S. Patent 2,374,227, issued April 24, 1945.

In the art of geochemical prospecting wherein a plurality of earth-content samples are systematically taken over an area to be prospected, each sample enclosed in an individual container, and the samples subsequently

analyzed for constituents which are related to gases which normally migrate upward from a mineral deposit below the sampling points, the improvement, which comprises exhausting each container, placing such exhausted container at a substantial depth below the surface of the earth without substantial disturbance or aeration of said soil, and wherein such soil has not been previously disturbed at any substantially near locality, by means of a tool having provision for accommodating the container as well as means operable from the earth's surface for breaking the seal and resealing the container and adapted to be driven into the soil, the container while accommodated in said tool having communication with the exterior thereof, opening the exhausted container to aspirate fluid into said container from the soil surrounding said container only, resealing said container, and withdrawing the tool with the container to the surface, whereby the contained sample together with others of the said plurality may be analyzed to obtain data useful in locating said deposit. - Claims allowed, 3.

8301. Oil Well Testing Device. C. V. Millikan, Tulsa, Okla., assignor to Geophysical Research Corp., New York, N. Y., a corporation of New Jersey. U.S. Patent 2,374,557, issued April 24, 1945.

Apparatus of the character described, comprising a chamber having inlet and outlet ports, a check valve for said inlet port, an outlet port lift valve movable to closed position in the direction of fluid flow through said outlet port, biasing means tending to close said lift valve, a nonrotatable slidable member operable in one position to hold open said lift valve, a nonslidable rotating member, and interengageable means on said rotatable and slidable members for maintaining the latter in position to hold open said lift valve, said means being disengaged in one position of said rotatable member relative to said slidable member to permit said lift valve to close, and means for driving said rotatable member. - Claims allowed, 8.

8302. Geochemical Well-Logging. Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U.S. Patent 2,374,937, issued May 1, 1945.

A method of logging a borehole which comprises collecting samples of soil at spaced intervals along the borehole, analyzing each sample for its content per unit weight of at least one substance selected from the group consisting of ionizable inorganic salts and the component ions thereof, the substance selected being the same for all samples, and correlating the concentrations of said substance so determined in the respective samples with the depths from which the samples were taken, the samples collected being sufficient in number to yield data showing the variation in concentration of the selected substance with depth, whereby such correlation may be interpreted to predict the possible approach of the borehole to a petroleum deposit. - Claims allowed, 11.

8303. Amplification Control in Seismic Surveying. R. T. Cloud, Los Angeles, Calif., assignor, by mesne assignments, to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,375,283, issued May 8, 1945.

A device for geophysical prospecting that comprises means to create seismic waves in the earth, means to detect said waves and translate them into electrical vibrations, means to amplify said electrical vibrations, including at least one thermionic tube amplifier containing a plurality of tubes, means to vary the biasing potential on the grid of at least two tubes operating out of phase in said amplifier so as to control the degree of amplification of said vibrations without disturbing the base line thereof, and means to record said amplified vibrations. - Claims allowed, 8.

8304. Seismograph. J. P. Minton, Dallas, Tex., assignor, by meane assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,375,433, issued May 8, 1945.

In a timing system for electric seismographs having a record sheet and driving means therefor, the combination of a timing device for placing transverse parallel lines as indications of elapsed time on said record sheet comprising a base, a thin elastic plate having one end secured to said base and the opposite end free to vibrate a shutter carried by said free end of said reed, an electromagnet for moving said free end of said reed to an angular position to store energy therein, an energizing circuit for said electromagnet, and common means for starting said driving means and in quick succession closing and opening said energizing circuit to initiate vibration of said reed upon starting of said driving means. - Claims allowed, 3.

8305. Seismic Detector System. Eugene McDermott, Dallas, Tex., assignor to Geophysical Service Inc., Dallas, Tex. U.S. Patent 2,375,570, issued May 8, 1945.

Apparatus for seismic surveying, comprising a plurality of spaced seismometers for converting seismic waves into electrical waves, a plurality of channels for transmitting these electrical waves to a recorder, and a recorder arranged to record the waves from the respective channels on a single record for comparison, each of said channels including an amplification stage and an attenuation device, said attenuation devices each comprising a variable resistance for reducing the strength of the high-energy waves and means for varying said resistances in unison with each other to effect a reduction in attenuation as the incoming signals become weaker. - Claims allowed, 1.

8306. Electrical Prospecting System. H. M. Evjen, Houston, Tex., assignor to Nordel Corp., Houston, Tex., a corporation of Delaware. U.S. Patent 2,375,775, issued May 15, 1945.

A system for electrical prospecting comprising an earth current circuit, including a source of direct current, a pair of spaced earth electrodes, and a reversing switch connected between said source and said electrodes for reversing the earth current at a plurality of different predetermined controlled frequencies, a potential circuit including potential pick-up

electrodes located at spaced points lying within the field of influence of said earth current, an indicating device responsive to unidirectional potential connected to indicate the potential impressed on said potential circuit, and a reversing switch synchronized with said first reversing switch and connected in said potential circuit between said pick-up electrodes and said indicating device for converting the picked-up potential into a unidirectional potential suited to actuate said indicating device, a source of potential connected to introduce into said potential circuit a measuring potential opposing said picked-up potential, means for adjusting said measuring potential to obtain a null balance on said indicating device, and a compensating circuit interconnecting said earth-current circuit and said potential circuit, said compensating circuit having an input side connected to be energized by current flow in said earth-current circuit on the earth electrode side of said first reversing switch and including a filter network having an output side connected in said potential circuit, said filter network having characteristics such that its output potential varies with frequency in a manner to compensate for variations in picked-up potential due to normal changes of the earth current circuit with frequency and being so arranged that the readings of the adjustments of said adjusting means obtained at different earth current frequencies approximate a horizontal curve with ripples designating significant variations in the earth's strata. - Claims allowed, 7.

8307. Electrical Prospecting System. H. M. Evjen, Houston, Tex., assignor to Nordel Corp., Houston, Tex., a corporation of Delaware. U.S. Patent 2,375,776, issued May 15, 1945.

A system for electrical prospecting comprising an earth-current circuit including spaced earth-current electrodes, means supplying to said electrodes for passage through the earth a current in the form of a series of similar pulses, successive pulses being in opposite directions and being spaced by a gap period during which no current flows, said gap periods and said pulse periods together forming a repeated pattern of controlled frequency, probe electrodes in the earth within the field of influence of said earth current, a potential measuring circuit connected to said probe electrodes including a D. C. potential measuring instrument, and a reversing switch timed to close said measuring circuit only during current gap periods and to convert the picked-up potential into a unidirectional potential suited to actuate said measuring instrument. - Claims allowed, 7.

8308. Electrical Prospecting System. H. M. Evjen, Houston, Tex., assignor to Nordel Corp., Houston, Tex., a corporation of Delaware. U.S. Patent 2,375,777, issued May 15, 1945.

A system for electrical prospecting comprising an earth-current circuit including a source of direct current, spaced earth-current electrodes and connections supplying current from said source to said electrodes for passing a current through the earth, means in said circuit to interrupt and reverse said current at a controlled low frequency with controlled current gap periods at each interruption during which no current flows, a potential

circuit including potential pick-up electrodes located at spaced points within the field of influence of said earth current, and a measuring circuit connected to said pick-up electrodes, said measuring circuit comprising a D. C. potential measuring instrument, interrupting and reversing means timed with said first interrupting and reversing means to connect said measuring instrument across said pick-up electrodes only during current gap periods and to reverse the connections to said measuring instrument at successive current gap periods to rectify the picked-up potential induced by said earth current, a potential responsive circuit, means timed with said first interrupting means to connect said last circuit to said pick-up electrodes during successive earth current flow periods, means in said last circuit to derive a potential proportional to the potential picked up during said successive earth current periods, and means timed with said second interrupting and reversing means to apply said derived potential to said measuring instrument in a direction and at a time to oppose the picked-up potential applied thereto from said pick-up electrodes during said current gap periods to afford thereby a highly sensitive indication of their relative values. - Claims allowed, 5.

8309. Apparatus for Making Geophysical Exploration. H. M. Evjen, Houston, Tex., assignor to Nordel Corp., Houston, Tex., a corporation of Delaware. U. S. Patent 2,375,778, issued May 15, 1945.

The method of electrical prospecting which comprises passing through the earth a current from a direct current source, periodically interrupting and reversing said current at a controlled low frequency with predetermined current gap intervals at each interruption, picking up the potential between spaced points within the field of influence of said earth current during the current gap intervals, passing a second current from a direct current source through the earth during each current gap interval in a direction to oppose the picked-up potential, regulating said second direct current to exactly balance out the picked-up potential and measuring the ratio between said first and second direct currents when said balance is obtained. - Claims allowed, 12.

8310. Thermometer. George Bouyoucos, East Lansing, Mich., assignor to Michigan State Board of Agriculture, East Lansing, Mich., a corporation of Michigan. U. S. Patent 2,375,892, issued May 15, 1945.

An electrical resistance thermometer comprising an electrically non-conductive heat-conducting container, an electrically conductive nonelectrolytic liquid in said container adapted to vary in electrical conductivity in accordance with variations in the temperature thereof, and a pair of spaced-apart electrodes having portions thereof within said container, the said portions of the electrodes being wholly immersed in said liquid and adapted to constitute a portion of means for passing a current of electricity through said liquid. - Claims allowed, 5.

8311. Geochemical Prospecting. R. T. Sanderson, Fishkill, N. Y., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,375,949, issued May 15, 1945.

A method of geochemical prospecting comprising removing soil gases from soil, trapping condensable hydrocarbons therefrom, conveying said trapped hydrocarbons to a hydrocarbon measurement zone in a sample of oxygen-containing gas, and comparing the amounts of hydrocarbons in said sample of gas and in a second sample of gas from the same source but free of said trapped hydrocarbons. - Claims allowed, 12.

8312. Gas Analysis. Leo Horvitz, Houston, Tex. U. S. Patent 2,376,145, issued May 15, 1945.

In an apparatus for analyzing gases for their content of combustible constituents present therein in minute amounts, in combination, means for separating and isolating from said gas said combustible constituents, means forming with said first-mentioned means a closed circulating system including a gas collection receptacle and said pump, a combustion chamber in said second circulating system, a refrigerating zone in said second circulating system, and means for introducing a combustion-supporting gas into said second circulating system. - Claims allowed, 1.

8313. Well Logging. W. D. Mounce, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,376,168, issued May 15, 1945.

An apparatus for logging a well, comprising an electrode carrier having at least three spaced electrodes, a source of alternating current, a conductor for connecting said source to only one of said electrodes, a second conductor connecting two other electrodes, whereby an alternating current is set up in said second conductor due to A. C. potential differences between said connected electrodes, means carried by said electrode carrier and electrically connected to said first conductor for converting said alternating current to a D. C. potential, and means electrically connected to said first conductor at the surface for measuring said D. C. potential. - Claims allowed, 25.

8314. Amplifying Apparatus. S. A. Scherbatskoy, Tulsa, Okla., assignor to Engineering Laboratories, Inc., Tulsa, Okla., a corporation of Oklahoma. U. S. Patent 2,376,195, issued May 15, 1945.

A device for geophysical prospecting that comprises means to create seismic waves in the earth, means to detect said waves and translate them into electrical vibrations, means to amplify said electrical vibrations, including at least one thermionic tube amplifier containing a plurality of tubes, means to vary the biasing potential on the grid of at least two tubes operating out of phase but in cascade in said amplifier so as to control the degree of amplification of said vibrations without disturbing the base line thereof, and means to record said amplified vibrations. - Claims allowed, 1.

8315. Ionization Chamber. S. A. Scherbatskoy, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,376,196, issued May 15, 1945.

An ionization chamber adapted for use in detecting radiations caused by nuclear disintegrations that comprises a housing, an ionizable medium in said housing, a coat of insulating varnish carried by the inner wall of said housing, at least two electrodes disposed within said housing in the ionizable medium, one of said electrodes being a conductive paint that is applied to the inner surface of the insulating varnish that is carried by the inner wall of the housing, and conductors leading from the electrodes to a point outside of the housing for electrical connection to said electrodes. - Claims allowed, 10.

8316. Photoelectric Recording System. R. L. Hood, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., a corporation of Maine. U. S. Patent 2,376,311, issued May 15, 1945.

A device for recording a function of the temperature differential between two temperature responsive devices including in combination, means for converting changes in temperature differential into proportional changes in direction of two beams of visible light, means for converting the directional changes in the light beams into proportional changes in electrical energy and means for progressively recording a function of the changes in electrical energy. - Claims allowed, 9.

8317. Geochemical Prospecting System. R. C. Lawlor, Pasadena, and H. E. Metcalf, San Francisco, Calif., assignors, by direct and mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U.S. Patent 2,376,366, issued May 22, 1945.

The method of geochemical prospecting that comprises placing an unsealed container at a substantial depth below the surface of the earth, without substantial disturbance of the earth near the container, by a tool having provision for accommodating the container and also for exhausting air from the container and subsequently sealing it, both from the earth's surface, thereby exposing the interior of the container to the surrounding soil, exhausting the air in the container to the earth's surface to aspirate liquids and gases from the soil into the container, then sealing the container by operation of said tool, then removing the tool and container to a position above the surface and then removing the aspirated liquids and gases from the container. - Claims allowed, 2.

8318. Electrical Prospecting Method and Apparatus. J. W. Millington, Beaumont, Tex., assignor to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U.S. Patent 2,376,610, issued May 22, 1945.

The method of determining the location and character of formations penetrated by a borehole comprising providing, in formations penetrated by the borehole, a signal current wave having oscillations varying in both frequency and amplitude due to changes in said formations along the hole, and separately determining visibly and quantitatively and in the same run said frequency and amplitude variations of the oscillations of said current wave. - Claims allowed, 5.

8319. Apparatus For Detecting Underground Metallic Objects. H. Chireix, Paris, France; vested in the Alien Property Custodian. U. S. Patent 2,376,659, issued May 22, 1945.

In apparatus for the detection of metallic objects, the combination of an oscillation generator, means to stabilize the frequency of said generator, a tuned circuit excited by said generator and including a search loop which is adapted to be positioned in the zone where metallic objects are to be detected, a bridge circuit having four legs which form, in an electrical sense, a square with two diagonals, circuit means impressing the voltage of said tuned circuit across one diagonal of said bridge and the voltage of said generator across the other diagonal of said bridge, said bridge being effective when said tuned circuit is in resonance to produce a balance of voltages, and means to produce a signal in response to an unbalance of voltages caused by the presence of a metallic object adjacent said loop. - Claims allowed, 3.

8320. Apparatus For Sonic Detection. J. R. Steinhoff, Washington, D. C. U. S. Patent 2,376,730, issued May 22, 1945.

In a sonic direction-finding device, four directionally responsive microphones divergently directed at an angle of 90° , one to the other in a horizontal plane, a direction indicator responsive to signals from said microphones, means for impressing signals from each of said microphones upon said indicator in a sense directionally oriented in correspondence with the direction of said microphones, a further microphone positioned to receive substantially only station noise, and means for reducing the signals from each of said first microphones in proportion to the strength of the signal from said further microphone. - Claims allowed, 7.

8321. Well Logging Instrument. S. A. Scherbatskoy, R. E. Fearon, and Jacob Neufeld, Tulsa, Okla., and Gilbert Swift, Red Bank, N. J., assignors to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,376,821, issued May 22, 1945.

In an apparatus for well surveying, a measuring instrument for lowering into a drill-hole, which comprises an elongated tubular case sealed against the entrance of well fluids and comprised of at least two sections threaded together, the lower section of which forms the outer walls of an ionization

chamber, and the upper section of which houses apparatus for measuring the flow of current in the ionization chamber and sending signals indicative of the resultant measurements to the surface of the earth, said measuring apparatus being constructed as a unit adapted to slip into the outer casing and be connected to the ionization chamber by a socket and plug connection and being comprised of two sub-units, one containing the measuring circuit and the other containing a power source for operation of the measuring circuit, the unit containing the power source being adapted to slip into one end of the unit containing the measuring circuit and be attached thereto by a plug and socket connection. - Claims allowed, 5.

8322. Method of Determining the Permeability of Earth Formations. P. J. Lehnhard, Jr., Houston, Tex., assignor to The Dow Chemical Co., Midland, Mich., a corporation of Michigan. U.S. Patent 2,376,878, issued May 29, 1945.

In a method of determining the permeability of a formation penetrated by the bore of a well, the steps which comprise introducing two immiscible fluids into the well bore, one being of higher specific gravity and electrical conductivity than the other, so as to form two layers of fluid in the well bore, ascertaining the position of one of the fluids in the well bore, maintaining one of said fluids adjacent the portion of the formation the permeability of which is to be tested, by controlling the rate of introduction of said fluids into the well bore and forcing the fluid adjacent the section of the formation to be tested into that portion of the formation at a known rate and under a known pressure, whereby said known rate gives an indication of the permeability of that portion of the formation. - Claims allowed, 2.

8323. Dynamic Earth Inductor Compass, A. S. Riggs, Chicago, Ill., and H. H. Thompson, Mountain Lakes, N. J., assignors to Sperry Gyroscope Co., Inc., Brooklyn, N. Y., a corporation of New York. U. S. Patent 2,376,883, issued May 29, 1945.

In an earth inductor compass, a conducting loop mounted for oscillation about a vertical axis in the plane of the loop, resilient restraining means limiting the amplitude of oscillation, means producing oscillation about said axis including a coil having a substantially horizontal magnetic axis for producing flux interacting with the flux of said loop, a source of alternating current, and a source of direct current, one of said sources being connected to said loop and the other to said coil, and connected means for indicating the potential generated in said loop when oscillating in the earth's magnetic field. - Claims allowed, 12.

8324. Geochemical Prospecting. Bela Hubbard, Mount Vernon, N. Y., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,377,082, issued May 29, 1945.

A method for determining if the wax in a wax-containing material is of petroleum origin, which comprises extracting said material with a solvent for said wax, slowly evaporating the solvent from the extract to promote the growth of orthorhombic crystals, and maintaining the crystals formed under conditions such as to preserve the platelike structure, characteristic of wax of petroleum origin, of said crystals. Claims allowed, 3.

8325. Accelerometer. R. B. Cottrell, Chicago, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey. U. S. Patent 2,377,212, issued May 29, 1945.

A device including a frame, a mass supported from said frame and relatively movable with respect thereto, a tension strap connected to said mass and said frame, and means for indicating changes in the tension of said strap. - Claims allowed, 6.

8326. System for Geological Exploration by Elastic Waves. Frank Rieber, Los Angeles, Calif., assignor, by direct and mesne assignments, to Continental Oil Co., Ponca City, Okla., a corporation of Delaware. U.S. Patent 2,377,903, issued June 12, 1945.

An apparatus for recording decaying transients comprising a detector, an amplifier adapted to amplify the impulses from said detector, a recorder connected to said amplifier for recording the impulses from the amplifier, means for varying the recorder response substantially inversely to the amplitude of the decaying transient to be recorded in a way to effect recording of the waves of smaller magnitude with sufficient magnitude to permit their form to be studied. - Claims allowed, 13.

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